Vol. 136. No. 2 February, 1932 Price 25c

AMERICAN GAS JOURNAL

Established 1857 Pioneer of the Gas Industry

Manufactured and Natural Gas

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BOONE-CHILTON COALS

Established as outstanding values for Gas Manufacture in all classes of equipment.

Produced and Sold by the

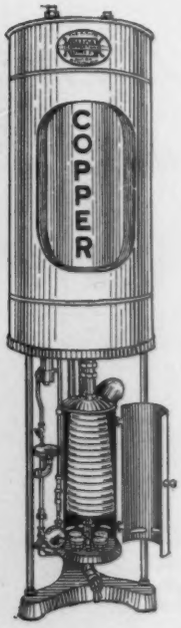
BOONE COUNTY COAL CORP.

Mines in BOONE AND LOGAN COUNTIES
WEST VIRGINIA

Sales Offices

PHILADELPHIA CHICAGO

If I Had Only Been Told When I Bought that Heater



Not a day passes that we do not hear this statement from some one who has purchased a galvanized heater, to find it useless after a few short years.

How many of your customers are buying future trouble, when a word from you would show the tremendous advantage in hot water service, in economy, and in long useful life, in the slight additional investment in a Kompak.

Prices for Copper are the lowest in history, giving a wonderful opportunity for the gas executive to install COPPER KOMPAK HEATERS that will give years of continuous service.

THE HEATER WITH
A COPPER TANK
GUARANTEED
20 YEARS.

THE KOMPAK CO.

Automatic Thermostatic Gas Water Heaters

NEW BRUNSWICK
NEW JERSEY

KOMPAK
TRADE MARK REG.

AMERICAN
GAS JOURNAL
Established 1859 *Pioneer of the Gas Industry*

Manufactured and Natural Gas

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Vol. 136, No. 2 February, 1932 Whole Number 3698

TABLE OF CONTENTS

The Metamorphosis 23

Problems Galore 24

High Cost of Water Heating 24

Modern Compressor Station Installed to Handle Increasing Load—George Eshrick, Jr. 25

Taking It on the Chin 27

Natural Gas in New York State 28

Pipe Line Review Notes—W. S. Johnston 31

Does It Pay to Insulate?—George H. Waring 33

Commodity Competition as It Affects Gas —R. S. McBride 36

What the Manufacturers Expect from the Gas Companies—David F. Kahn 39

The Safe Utilization of Natural Gas—A. A. Klinge 42

Industrial Furnaces for Gas—Lawrence E. Biemiller 46

American Gas Merchandising Almanack 50

Leaves from the Merchandising Log Book of Seth Starbuck 51

Cake Baking Research 53

New England Gas Association Holds Sixth Annual Convention 55

Heating and Ventilating Exposition Features New Equipment 57

Book Review 58

Equipment News 59

News of the Gas Industry 62

Personals 64

Trade News 68

INDEX TO ADVERTISERS, PAGE 81

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PERFORMANCE

AMERICAN METERS FULFILL THE REAL OBJECT FOR WHICH THEY ARE PURCHASED

. . . Their Quality Shows Up In Systematic Meter Records

THE most conclusive answer to the question of meter value is always derived from fact-finding meter records that tell the true story of performance. A slight variation in selling price or a superficial comparison of operating features quickly fades into insignificance when gas meters excell in fulfilling the real object for which they are purchased—accuracy and economical performance.

Another known factor in the value of American Meters is the reputation of the manufacturers. They are judged by experienced workmanship and service facilities, by research activity and by their cooperative contribution to the stabilization and advancement of the industry.

American Meters are available for every measurement specification. Either vegetable tanned or Chrome retanned diaphragms are furnished from skins of exclusive selection, quality and tannage. Full information about any type of American Meter will be sent on request.

JOHN J. GRIFFIN & CO.
Est. 1859

HELME & MCILHENNY
Est. 1848

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METRIC METAL WORKS
Est. 1888

MARYLAND METER WORKS
Est. 1866

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Est. 1901

NATH. TUFTS METER WORKS
Est. 1860

AMERICAN METER COMPANY
INCORPORATED
GENERAL OFFICES : 105 W.40TH STREET - NEW YORK, N.Y.

ARE YOU INTERESTED IN PRODUCER GAS?

Let us send you a copy of our new Bulletin No. 45 describing the
Semet-Solvay Koller Type Gas Producer

The design and operation of this unusually efficient gas machine is illustrated in detail.

We would be pleased to prepare studies of the economies made possible by the use of this producer in your plant.

SEMET-SOLVAY ENGINEERING CORPORATION

40 Rector Street, New York, N. Y.

THE SATURDAY EVENING POST

Blinders... *because she Shies At New Ideas*

FLYING MACHINES, horseless carriages—they had their skeptics. Every new idea, every great advance, does. Electrolux is no exception.

We don't mind that. For though Electrolux is four years old, has enjoyed a phenomenal success and is today in hundreds of thousands of homes, it is still the new idea, the big radical improvement in automatic refrigerators.

All we ask is that you go and see Electrolux with your eyes wide open. Judge the facts first hand.

You will find that Electrolux not only freezes ice cubes quickly and provides perfect constant cold always, but does this without sound, without machinery and at much less cost than any other refrigerator.

Is it any wonder that Electrolux sales in 1931 were far ahead of 1930?

You certainly owe it to yourself to see this remarkable refrigerator that has so greatly changed the old order of things. It is on display at the showroom of your gas company.

And if you'd like complete information by mail, write to us direct for free literature. Electrolux Refrigerator Sales, Inc., Evansville, Indiana.

ELECTROLUX

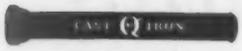
THE *Gas* REFRIGERATOR

THE OLD ORDER CHANGETH—a tiny gas flame takes the place of all moving parts.

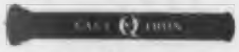
THIS ADVERTISEMENT APPEARS IN THE SATURDAY EVENING POST, TIME, COLLIER'S, AND GOOD HOUSEKEEPING

THE SATURDAY EVENING POST
Electrolux Ads
PACK A NEW WALLOP
in 1932
SUPPOSE you had to write Electrolux advertising. Would you find it necessary to concoct some makeshift sales story . . . play up some unimportant gadget? You would not!
Though more than 250,000 Electrolux have been sold during the past four years, the principle of Electrolux—of gas refrigeration that produces constant steady cold, with no stopping and starting—is still dynamic with news. It's radical, different . . . PLUS the fact that Electrolux is more practical, more economical than any other type of domestic refrigeration that has yet been devised . . . or is apt to be devised for a long time!
That's why you'd do just what we've done in preparing Electrolux advertising for 1932! You'd put that story into a form that would be certain to catch the attention . . . stick in the mind . . . demand action.
On the opposite page is reproduced the first of the 1932 series of advertisements for national magazines.
It won't be necessary to tell you to read this advertisement carefully. You will! But more than that, try this as a test. Let us send you an enlargement of this advertisement to hang on your wall. Watch the people who come into your office. Watch how few can resist the desire to read it once the headline has caught the attention. Note the comments! Then you'll know why Electrolux advertising this year is backing your sales effort more forcibly than ever before! Electrolux Refrigerator Sales, Inc., Evansville, Ind.
ELECTROLUX
THE Gas REFRIGERATOR

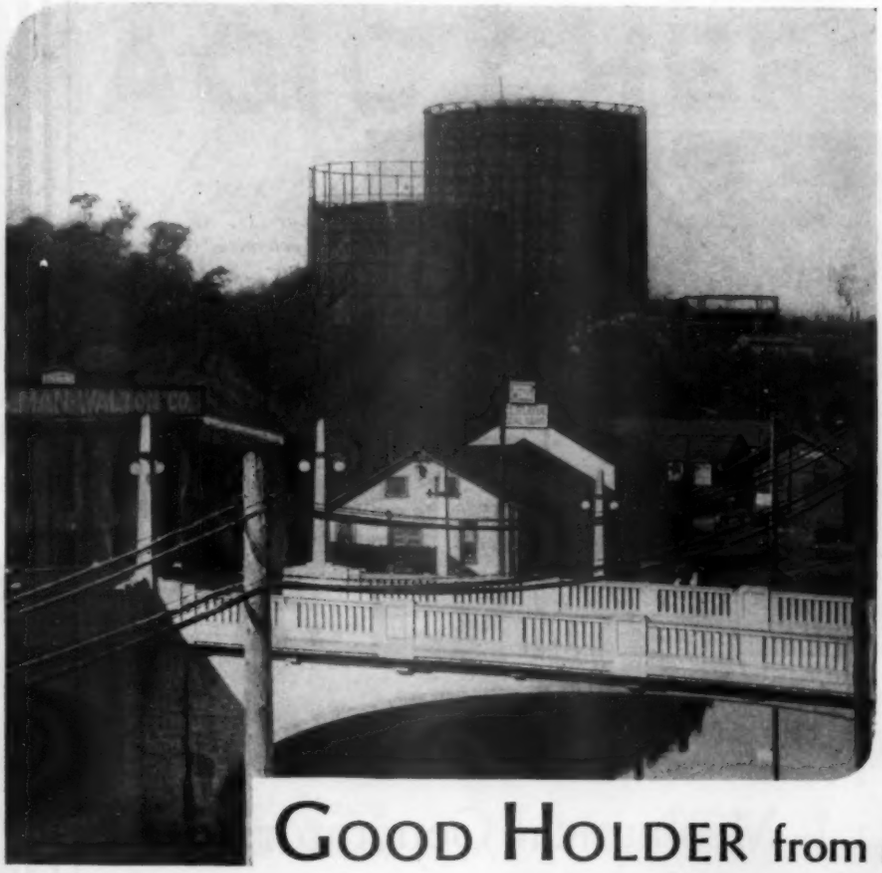
GAS-TIGHT Mechanical Joints



Every engineer knows tnat wherever a moving part enters a pressure chamber the "stuffing-box" principle is universally applied to prevent leakage. This fundamental principle is embodied in several mechanical joints with rubber gaskets and follower rings, made by members of The Cast Iron Pipe Research Association. It is not an untried principle as applied to cast iron pipe for high-pressure lines. Mechanical joints employing the *stuffing-box principle* have been in successful use for a number of years. Tests demonstrate that these joints are gas-tight under pressures and conditions more severe than those ordinarily found in gas distribution. For further information, write to The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 309 Peoples Gas Building, Chicago, Ill.



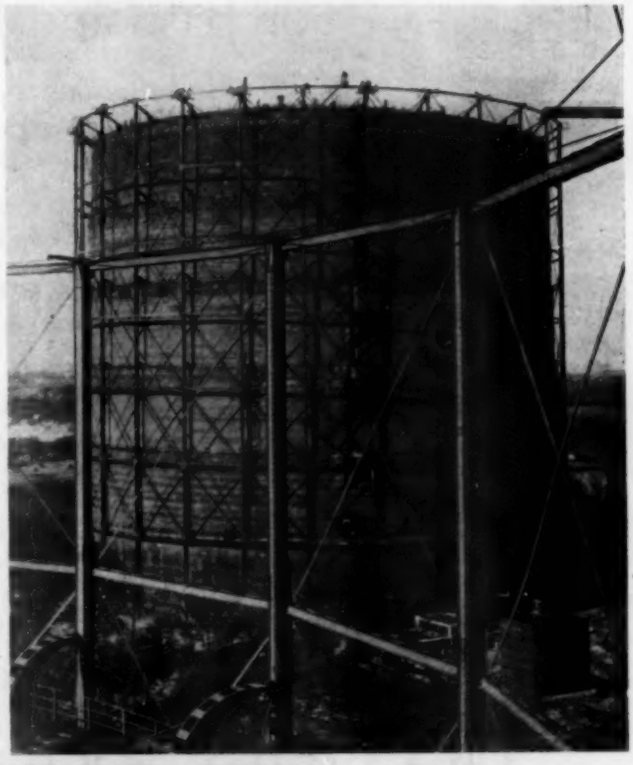
CAST IRON PIPE



GOOD HOLDER from 2 ANGLES

1. If you judge a Cruse-Kemper Holder from the far-seeing standpoint of cost, you will rightfully look forward to length of service with low maintenance.

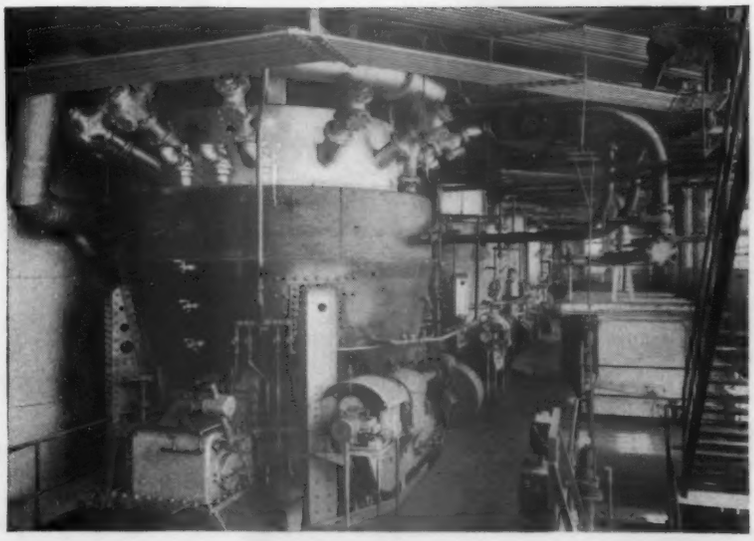
2. If your judging carries you to a closer scrutiny, to an examination of the most minute details of Cruse-Kemper design and construction, you will appreciate that the low annual charges result directly from good engineering carefully worked out.



• Manufacturers of GAS HOLDERS and other major equipment units for the GAS INDUSTRY

CRUSE-KEMPER CO.

MAIN OFFICE AND PLANT—AMBLER, PENNSYLVANIA



Four U. G. I. Mechanical Generator Sets at Chester, Pa., using Refinery Gas.

The U. G. I. Mechanical Generator For Base and Peak Loads

36 Installations to January First

•

ADVANTAGES

Continuous operation for extended periods
Low fuel consumption
Low labor costs
Low carbon loss in ash
Low maintenance
Heat otherwise lost retained as steam
Bituminous coal can be used as fuel

•

THE U. G. I. CONTRACTING COMPANY
DIVISION OF
UNITED ENGINEERS & CONSTRUCTORS INC.

Philadelphia
112 North Broad Street

Chicago
Conway Building

ALSO BUILDERS OF PIPE LINES AND GAS DISTRIBUTION SYSTEMS

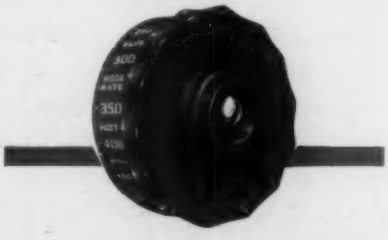
MAGIC CHEF . . .

here's a gas range you really can get excited about

Artyle

THE NEW
appealing finish

AS its latest contribution to the advancement of the industry, American Stove Company now presents Artyle, a new and distinctive gas range finish. This exclusive new Magic Chef finish in Old Ivory and Storm-gray is bound to stimulate new interest in modern gas range style and beauty.



Look for the RED WHEEL
When You Buy a MAGIC CHEF

MAGIC CHEF *Series 600*
in the ARTYLE *Finish*

American Stove Company has mobilized its entire organization . . . designing, manufacturing, advertising and selling . . . to awake a national consciousness and interest in gas ranges and gas for cooking, thus strengthening gas in its competitive position with other fuels. Magic Chef, as the product which has done most to advance gas for cooking, merits your interest and support.

(Look for this Trade Mark)

AMERICAN STOVE COMPANY
World's Largest Manufacturer of Gas Ranges

NEW YORK · PHILADELPHIA · ATLANTA · CLEVELAND
CHICAGO · ST. LOUIS · SAN FRANCISCO · LOS ANGELES

TO THE GAS INDUSTRY OF AMERICA

General Motors presents

● For more than a century scientists have sought to harness the mysterious cooling force discovered by Michael Faraday—a force created by applying heat to an absorbent powder and an easily vaporized liquid.

And now, after years of research, development and refinement General Motors presents the Faraday Gas Refrigerator—a Refrigerator almost as simple in its operating principle as the sealed test tube in which Faraday made his startling discovery—a new absorption Refrigerator, the operation of which is based upon the action and reaction of chemical material.

The Faraday Refrigerator combines many new and desirable features. It is completely soundless and without vibration. It operates at remarkably low cost. It offers extreme flexibility and ease of installation. It has

✣ ✣ ✣ Faraday

A GENERAL MOTORS PRODUCT

the Faraday GAS REFRIGERATOR

many other improvements which make it a real achievement in the automatic refrigerator field.

This unusual refrigerator, backed by the resources and the engineering skill of General Motors Corporation, the largest organization of its kind in the world, is now offered to the Gas Industry of America. It is now being manufactured in limited quantities and distributed through Gas Utility Organizations. Production is rapidly increasing, and additional franchises will be awarded just as rapidly as increased production justifies.

And with each franchise go complete selling helps and a business-building merchandising service based upon the extensive experience of General Motors in marketing its various other products.

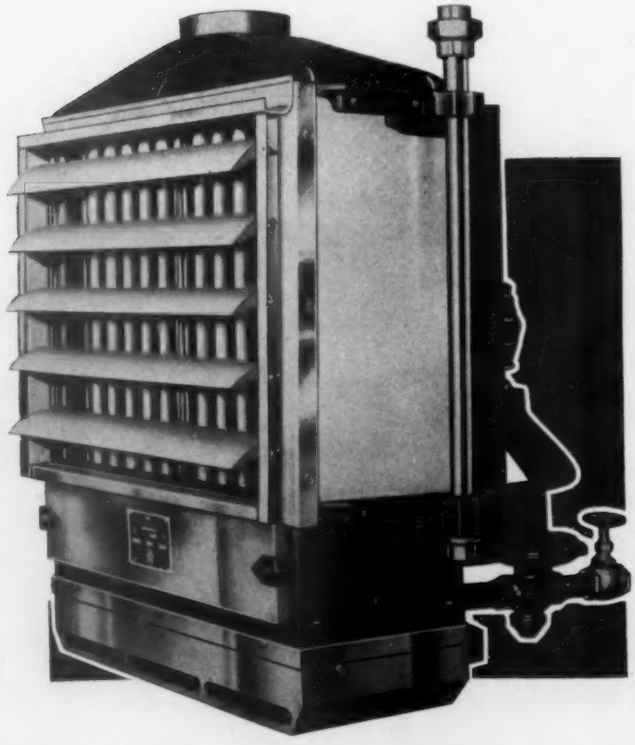
If you'd like more of the facts about the new Faraday Refrigerator or about plans for its distribution, write us.

Refrigerators

FARADAY REFRIGERATOR CORP., DAYTON, OHIO

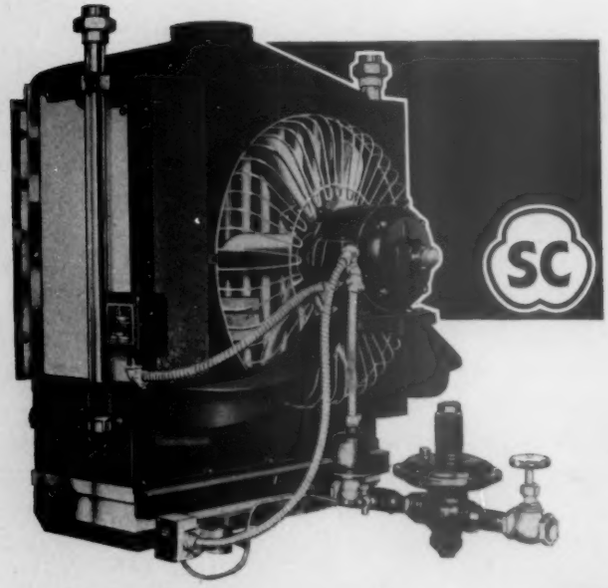
With these new features-

you will obtain better, more economical service with Unit Heaters by SC



Gas fired unit heaters, already known to be most practical, efficient and economical for commercial and industrial heating, now take on greater popularity with the advancements in design in this new heater by Surface Combustion. Added to the advantages of the Unit Heater principles of operation are:

1. American Gas Association Approval.
2. Patented two stage atmospheric burner.
3. Readily adaptable to outside air for combustion requirements.
4. Streamline heating tubes—maximum heat transfer—minimum air resistance, saving in electrical consumption.
5. Corrosion and temperature resisting heating elements—long life chrome steel alloy metal.
6. Frequent cleaning of heating tubes unnecessary.
7. Simplified positive protective control system.
8. Low cost of equipment—less than steam with coal boiler.
9. Compact design—neat appearance—installation practical in all industrial and commercial spaces.
10. Simplified installation—unit completely assembled.
11. Simplified burner adjustment—no complicated air and gas settings.
12. Aluminum alloy fan blades—light weight—minimum electrical consumption.



You probably know of many places—stores, filling stations, shops, garages, etc.—where SC unit heaters are needed. Write and we'll be glad to send you a fuller description. Or our engineering layout service will help you on the heating of any particular building.

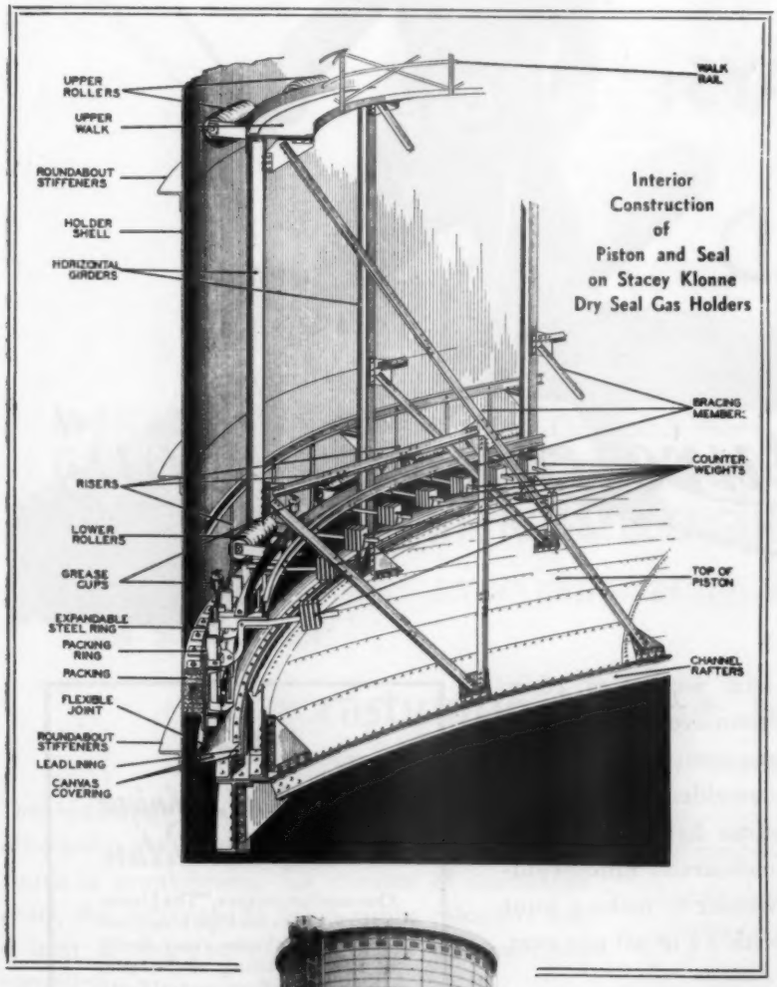
Surface Combustion

TOLEDO, OHIO

Sales and Engineering Offices in All Principal Cities

Also makers of... HEATMASTER AND K-SERIES FORCED AIR SYSTEMS...GARAGE HEATERS...RANGE BURNERS...COLUMBUS FURNACES...JANITROL...THRIFT WATER HEATERS

HERE IT IS STUDY IT

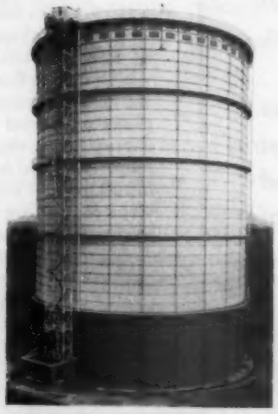


Interior Construction of Piston and Seal on Stacey Klonne Dry Seal Gas Holders

THIS IS THE SEAL ON THE STACEY KLONNE DRY HOLDER

NO WATER NO LIQUIDS OR PUMPS

ELIMINATES THIS CONSTANT OPERATING AND MAINTENANCE EXPENSE



The surprising simplicity of the dry seal on the Stacey Klonne holder is most interesting to any gas plant operator who is attempting to increase the efficiency of his plant and to reduce operating expenses. The Stacey Klonne Dry Seal Holder is trouble free and requires practically no attention.

Klonne holders are in successful use throughout the world, operating with equal satisfaction in the cold of Siberia and the heat of Algiers.

Complete descriptive literature will be forwarded upon request.

THE STACEY BROTHERS GAS CONSTRUCTION COMPANY
THE STACEY MANUFACTURING COMPANY

5533 Vine Street, Cincinnati, Ohio

SUBSIDIARIES OF INTERNATIONAL-STACEY CORPORATION

NEW YORK PITTSBURGH COLUMBUS CONNERSVILLE CHICAGO DETROIT ST. LOUIS TULSA FORT WORTH
HOUSTON BEAUMONT SHREVEPORT LOS ANGELES BUENOS AIRES MARACAIBO

This COMPANY SAYS: "LINDEWELD on all future construction"

AFTER Lindewelding a 35-mile trial section of 16-in. pipe and giving it harder tests than ever would occur in service, an important California gas company has stated that all future pipe lines will be Lindewelded.

The strength of Lindewelded joints has been amply proved. Their low cost is easy to demonstrate. Lindewelding is cheaper because it enables a welder to make a joint in 30 to 60 per cent. less time and with 35 to 40 per cent. less welding material.

Lindewelding can be done with ordinary blowpipes or with special apparatus which makes the welding almost automatic and further increases its speed. Experienced welders quickly adapt themselves to this new method of oxy-acetylene welding, and beginners learn it readily.

Procedure Controls for Lindewelding are available to all users of Linde Oxygen. Let our nearest district office show you how Lindewelding can save time and money on your next pipe line job.

Study Lindewelding Technique in this Motion Picture

Our motion picture, "The Lindeweld Process for Pipe Line Construction," shows every detail of Lindewelding technique, which differs from neutral flame welding technique in that it employs a special rod, a special flame adjustment, and the "backhand" method of blowpipe manipulation. It reveals the actual steps in making a Lindewelded joint. Pipe line officials and welding or engineering societies may borrow this picture free of charge by writing to any Linde District Office. It is furnished in 16 mm. and 35 mm. safety film.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stocks

IN CANADA, DOMINION OXYGEN COMPANY, LTD., TORONTO

District Offices

Atlanta	Detroit	New York
Baltimore	El Paso	Philadelphia
Birmingham	Houston	Pittsburgh
Boston	Indianapolis	St. Louis
Buffalo	Kansas City	Salt Lake City
Chicago	Los Angeles	San Francisco
Cleveland	Milwaukee	Seattle
Denver	Minneapolis	Tulsa

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

Indicating Installations of Coal Gas Generating Equipment Recently Completed by

IMPROVED EQUIPMENT-RUSSELL ENGINEERING CORPORATION

ENGINEERS—BUILDERS

24 State Street New York

Procrastination: The Super-Thief

The industrial "Raffles", the robber of gas plant efficiency, the attendant of impaired results, the cause of breakdowns, the creator of increased costs, the detriment to good public relations and a host of many other and more exasperating conditions.

Such are the dangers, the expense-provoking dangers, all too apparent because of run-down, worn-out benches.

Yes — you say, they are still in service; granted, but may we ask, how much longer can they serve?

Just think it over and realize what it means. You cannot continue to sidestep the issue.

To repair, refill or rebuild NOW may save you many dollars and much grief. Further delay can only involve greater expense.

Why gamble dollars against time? Invariably you lose.

IMPROVED EQUIPMENT-RUSSELL ENGINEERING CORPORATION

ENGINEERS *BUILDERS*

NEW YORK

Philgas
COMPANY

means

LIQUEFIED PETROLEUM GASES

G-3 Propane

for cylinder distribution as "bottled gas" ▸ ▸ for distribution in undiluted form through mains.

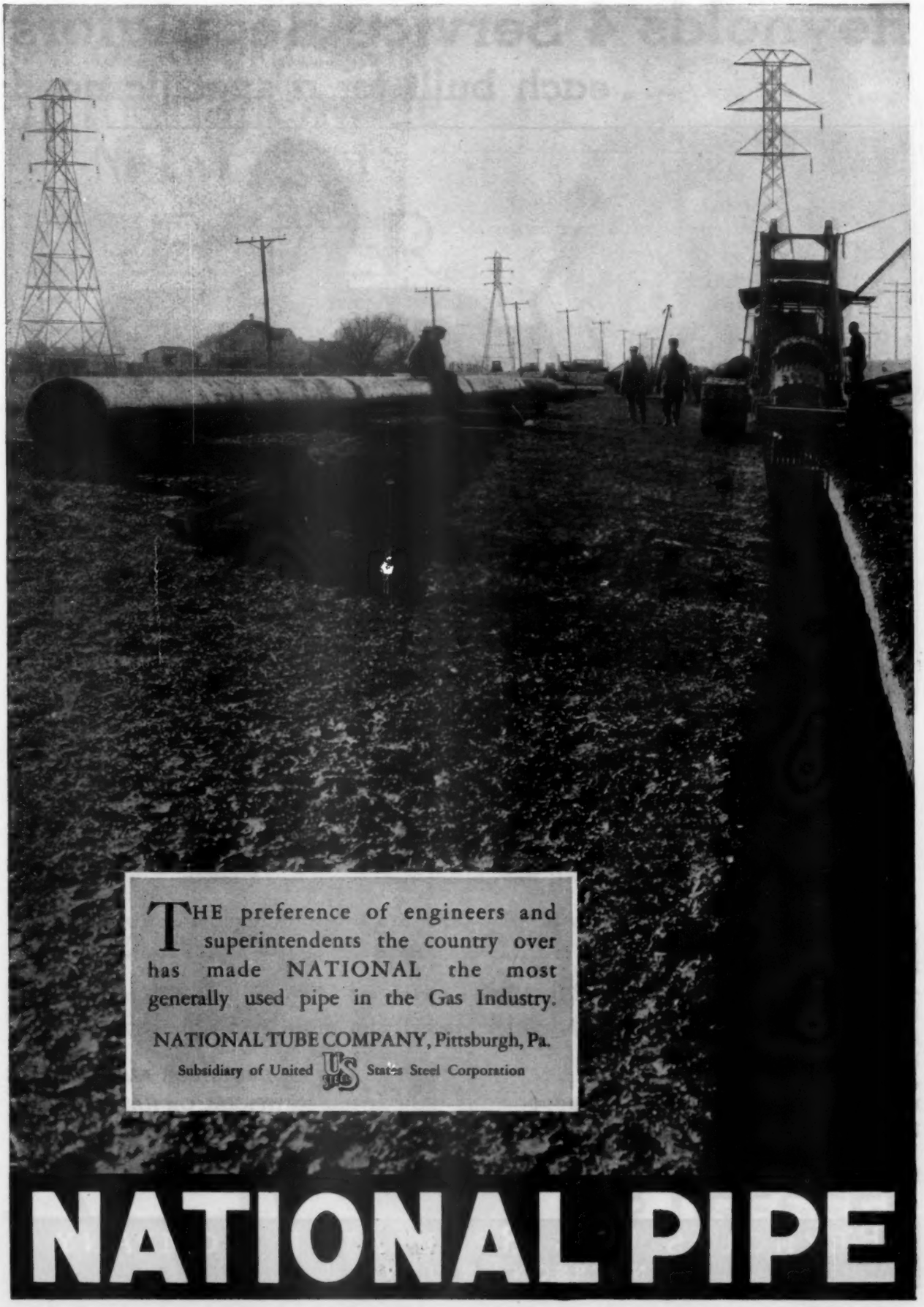
G-4 Butane

for Butane-air gas plants ▸ ▸ for peak load standby ▸ ▸ for gas enrichment ▸ ▸ for industrial fuel.

Engineering Service

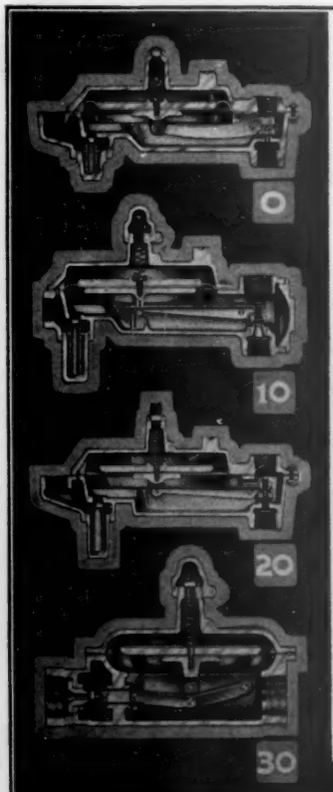
representing years of experience in the uses of liquefied petroleum gases ▸ ▸ unmatched production and transportation facilities ▸ ▸ your inquiry is welcome.

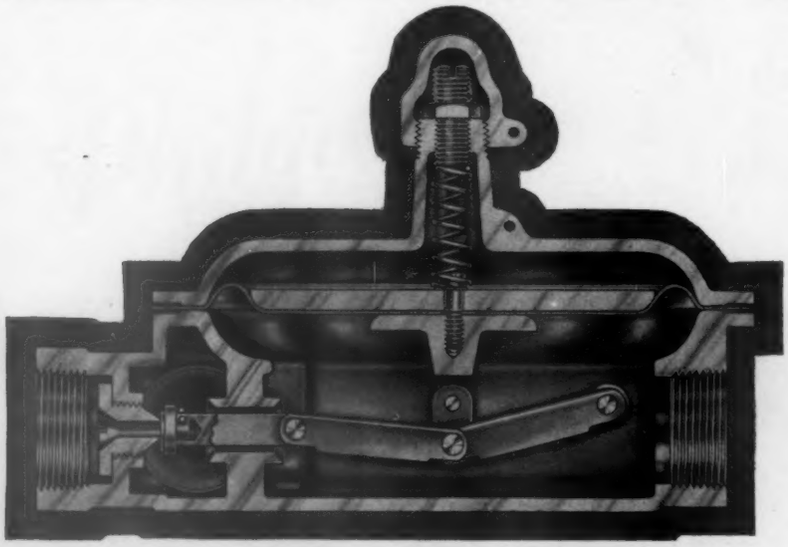
◂ PHILGAS COMPANY ▸
(SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY)
GENERAL MOTORS BUILDING, DETROIT
80 BROADWAY ▲ ▲ ▲ NEW YORK


THE preference of engineers and superintendents the country over has made NATIONAL the most generally used pipe in the Gas Industry.
NATIONAL TUBE COMPANY, Pittsburgh, Pa.
Subsidiary of United States Steel Corporation
NATIONAL PIPE

Reynolds 4 Service Regulators

. . . each built for a specific need





MODEL 30 Features toggle type lever control. Made for any service requirement. Built in either Horizontal or Vertical Connections

● **MODEL 20**—The design of this Regulator is primarily the same as that of Model 10. However, Model 20 features all parts so accessible as to permit interchangeability in the shop. The material used in the construction of this Regulator, as in all Reynolds Units, is of A-1 quality.

● **MODEL 10**—All parts are interchangeable and so accessible that it is not necessary to remove regulator from pipe line.

● **MODEL 0**—With or without Mercury Seal. The old standard; has served successfully for more than a quarter-century.

● **REYNOLDS BRANCH OFFICES**
422 Dwight Building
KANSAS CITY, MO.
2nd Unit, Santa Fe Bldg.
DALLAS, TEXAS

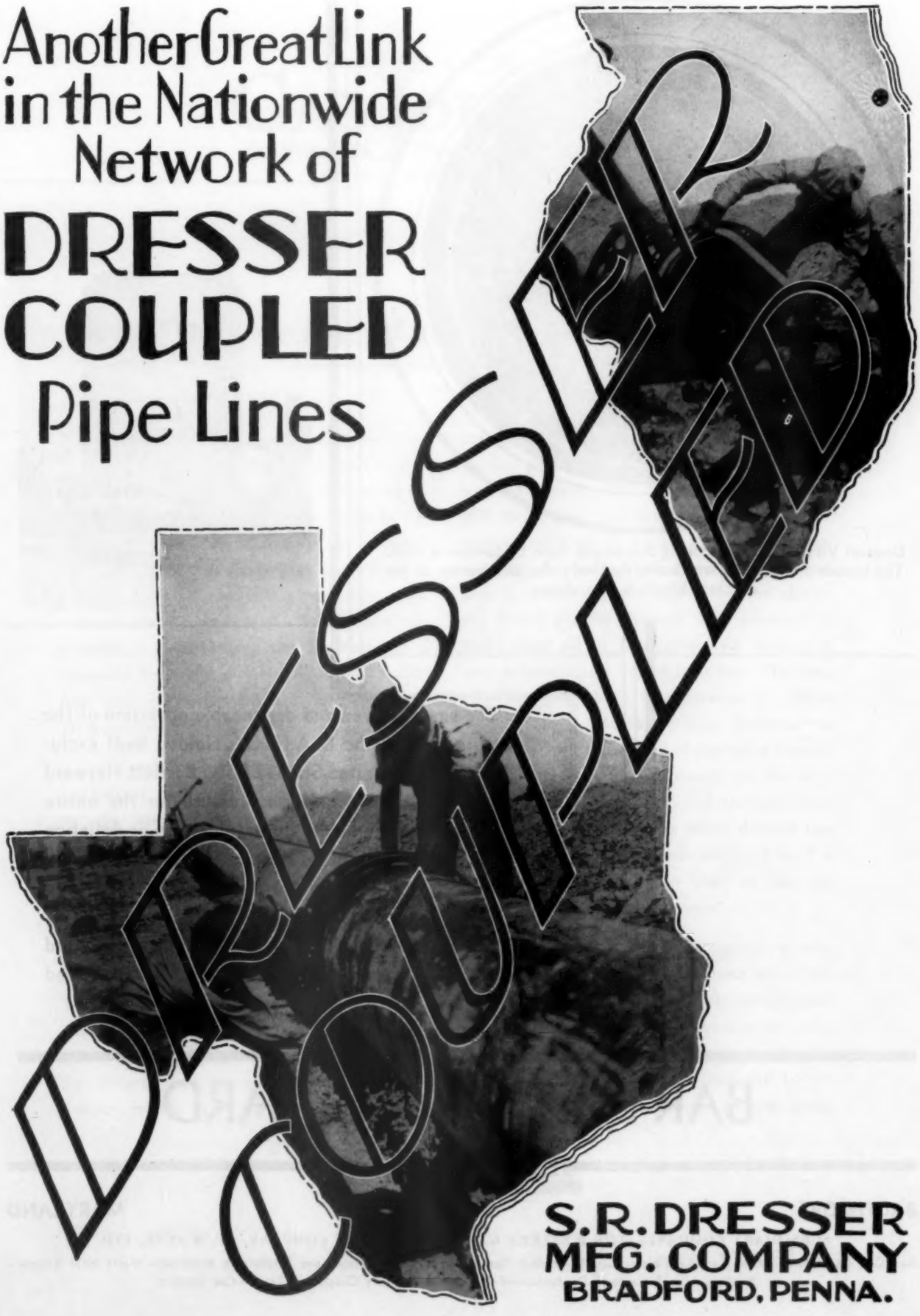
● **REPRESENTATIVES**
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry, Avon, N. J.

● **REYNOLDS PRODUCTS FOR ALL KINDS OF PRESSURE REDUCTIONS—FOR EITHER ARTIFICIAL OR NATURAL GAS**

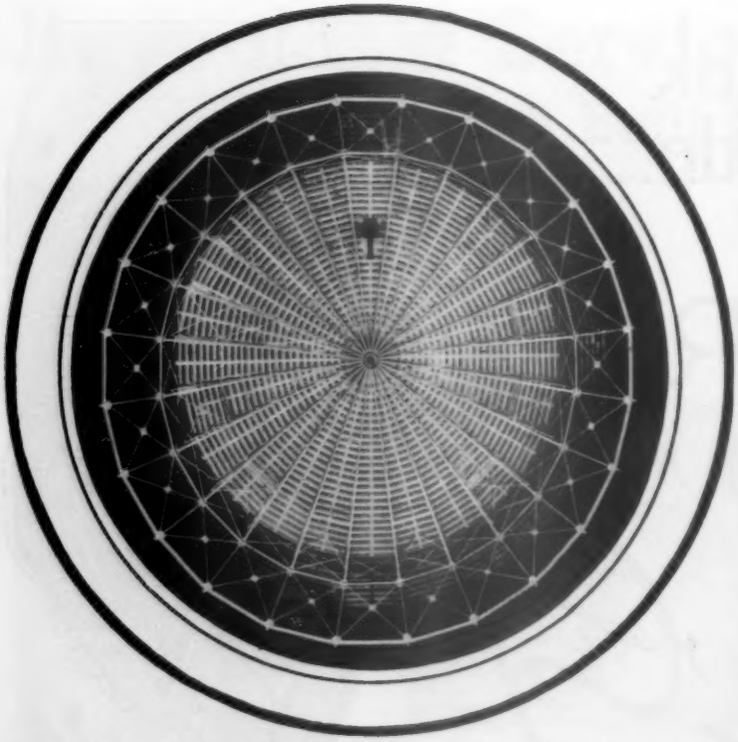
GOVERNORS—Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street. **REGULATORS**—High Pressure Service, Low Pressure Service, Intermediate Pressure, High Pressure Line, Single and Double District Station. **VALVES**—Automatic Quick Closing Anti-Vacuum, Relief, Cut-Off. **SEALS**—Mercury and Dead Weight.

REYNOLDS GAS REGULATOR COMPANY
ANDERSON, INDIANA, U.S.A.

Another Great Link in the Nationwide Network of DRESSER COUPLED Pipe Lines



S. R. DRESSER MFG. COMPANY
BRADFORD, PENNA.



Unusual View of Piston Looking Downward from Underside of Roof. The trusses and bracing are clearly outlined—the distribution of the concrete blocks is also shown

The smooth, even and dependable operation of the piston within the M.A.N. Gas Holder, built exclusively in the United States by The Bartlett Hayward Co., results in a uniform pressure for the entire capacity of the holder during inflation or deflation alike. By virture of its constant weight and smooth operation a constant pressure is maintained throughout the entire travel of the piston. This pressure can be increased, within limits, if desired by ballast, generally concrete blocks, distributed over the entire piston.

THE BARTLETT HAYWARD COMPANY

BALTIMORE **MARYLAND**

SUBSIDIARY COMPANY: THE WESTERN GAS CONSTRUCTION COMPANY, FT. WAYNE, IND.

Coal Gas, Carburetted Water Gas, Blue Water Gas, By-Product Plants—De Brouwer Charging and Discharging Machines—Waste Heat Boilers—Purifiers—Tar Extractors—Condensers—Feld Scrubbers—Fast's Couplings—Tanks—Gas Holders

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HENRY M. RILEY, Editor

The Metamorphosis

LONG AGO—centuries, perhaps—some benighted dunderhead gave vent to the saying that "a woman could throw away more with a spoon than a man could bring in with a shovel." Certainly the present day miracle of the housewife stretching a dollar bill way past its supposedly well charted elastic limit quite belies this expression. If anything, she is receiving a spoonful from the paterfamilias and somehow doling it out with the effectiveness of a shovelful.

She is watching the family exchequer as never before; at the same time she is forming spending habits that are not only radically different from those that obtained during the "lush twenties," but ones that will persist well into the future. And, since over eighty per cent of the family purchases are directly influenced by her, it is obvious that the new spending habits which are partly molded by hard-bitten economic pressure should be studied and recorded by our own industry as well as others. Our merchandising future will be largely measured by the degree of success with which we are able to ascertain her changed mode of living and buying. And here is where a level-headed, forward thinking home service director can accomplish more than all of her company's engineers and technologists rolled into one. Indeed, here is a chance for Miss Home Service Director to take hold of the whip handle and lay about, to the end that what we thought was first class work during the past decade will not hold a candle to that in the ten years to come.

Let us, through the proper channel, find out what the housewife is thinking about and why. Then will come the solution for such problems as electric range competition and the broadening of gas service in the home.

FEB 13 1932

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As We See It

Problems Galore

SOME MANUFACTURED GAS MEN are prone to look back with a sigh to what they perhaps consider the golden days; to the time, six or eight years ago, when there was a strict line of demarcation between natural gas and manufactured gas territory; to the days when liquefied and by-product petroleum gases and long distance natural gas transmission lines were animals not even to be found in the zoo. These possibly, were the days when problems were pretty well solved and an even tenor of one's ways prevailed.

But living in the past causes one to fall mightily behind the procession. Natural gas has been made available at long distances from the fields at an attractive price, refinery and other gases are being produced in prodigious quantities, and oil is at an extremely low price. Much as one might abhor facing the truth, these are facts that exist. Accordingly, those inculcated with the spirit of pioneering will revel in tackling the task of arranging in orderly technological and economic fashion these fuels, and adapting the manufactured product to dovetail efficiently with them.

Here are problems galore. Here are questions whose correct answering will richly repay those who like to be in the front rank of trail blazers. Equipment manufacturers, too, who sharpen their pencils and grease their slide rules will, ten or less years hence, regard these problems as the boost to their then prosperous status.

High Cost of Water Heating

THE GAS MAN is quite properly sold on the idea that the ultimate in water heating, for nearly all home situations, is the automatic storage system; yet, how many times are we faced with the complaint that the gas bill has jumped excessively once such a system has been installed—particularly where it has supplanted a hand operated set-up. We know full well that, when such a complaint arises, the household obviously has been using hot water in quantities vastly in excess of those which obtained prior to the installation.

Psychologically, the situation is very like the full coal bin at the start of the heating season. Until an appreciable cavity is made in the fuel supply, heaped up shovelfuls are heaved into the maw of the furnace with reckless abandon. The idea seems to be that there is a big and fulsome supply available at one's beck and call, so away with stint and saving.

Nevertheless, we must face the fact that a complaint is a complaint, and like the common cold can spread with considerable speed. Thus we have the case of the woman of the home, by way of the bridge table and community club meeting route, spreading adverse talk anent the price of maintaining an automatic gas fired hot water storage system. Naturally, she does not mention the many uses she has made of hot water during the month and this aggravates the situation. In passing it might be well to point out an instance, showing to what absurdities the matter can go. We refer to a case where a hand operated gas tank heater was supplanted by an automatic system; the gas bill went up; the storage system is now on the way out and—the customer plans to install a small coal stove to do the water heating! Gas men have been known to wax profane over lesser provocations!

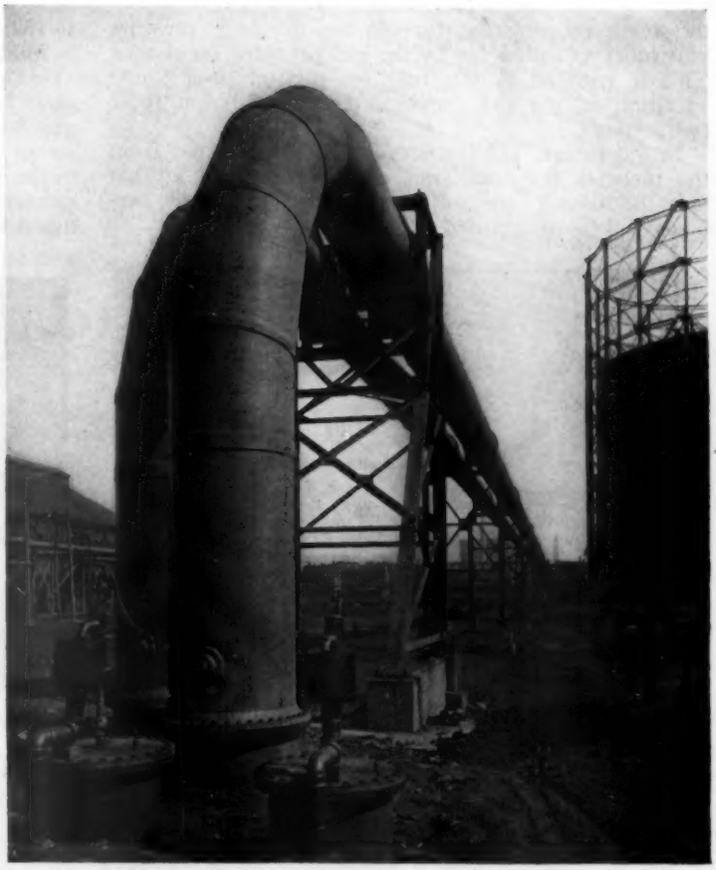
What can we do in similar cases to lay the complaint? Perhaps a few dollars and a water meter might answer the question. Assume a somewhat prominent family has registered a complaint of the above nature. (And, incidentally, there are scores of homes running into five figures, with two cars at hand, and a hand operated gas water heater or coal water heater in the cellar.) Instead of going into a maze of figures as to the cost of water heating, let us assume the gas company sent out a fitter and connected a water meter to the cold water inlet to the storage system and left it for a month. Then, at the end of this period, the gas company could show the customer that so and so many gallons of hot water had been used. The customer could then be advised to instruct the maid or children not to leave a hot water tap open while they rushed to the window to view a passing airplane or indulged in similar diversions.

Such a definite record of water consumption might be valuable to bring to the attention of others registering similar complaints, thereby obviating the need for installation of the water meter in an excessive number of cases.

Modern Compressor Station Installed to Handle Increasing Load

GEORGE ESHERICK, JR.

United Engineers & Constructors Inc.,
Newark Branch.



Overhead Welded Steel Mains handling Gas from the Holders

AT the West End Gas Plant in Jersey City, a new building has been erected and three (3) turbine driven centrifugal gas compressors installed by the United Engineers & Constructors Inc., Newark Branch, who also designed the project to meet the requirements set up by the Gas Department of the Public Service Electric and Gas Company. The compressor station will handle the increasing load in and to the north of Hudson Division, and replaces the present compressor plant which has been in operation since April, 1910. This new station has the added facility of pumping gas back to the Harrison Plant as occasion requires.

Building Construction

The building is constructed of concrete, steel and brick, set on two hundred (200) 35 ft. piles. The operating floor is approximately 12 ft. above grade and the basement 8 ft. below grade, being designed to provide ample clearance for all of the piping (gas, water, steam and exhaust). The compressors are set on foundations 20 ft. high, which in turn stand on the concrete mat capping the piles. To give the maximum light, the building is finished in white on the operating floor.

The three (3) centrifugal compressors are of the single flow, 3-stage type, manufactured by the Ingersoll-Rand Company, driven by Moore turbines, now operating at 125 pounds pressure. For economic reasons, these turbines have been designed to operate on 350 pounds steam, 100 degrees superheat for future operation, by merely making some minor changes in the turbine wheels. The turbines are of the mixed pressure extraction type, arranged at present so that steam can be either extracted from or admitted to the turbines at 10 pounds pressure. In the future, steam will be extracted from these turbines at 125 pounds and either extracted or admitted to the turbines at 15 pounds pressure. The turbines will operate normally at 28 inches of vacuum, but may also be run non-condensing. They have been designed for full automatic gas and steam pressure control, both for present and future operation. Each turbine has a total capacity of 1,480 B.H.P.

Salt water is pumped from the Hackensack River to three (3) Schutte-Koerting Multi-jet condensers which maintain the vacuum. All the water passes through a Rotrex revolving screen before entering the condensers which are placed outside the building, so that the building may be kept dry and clean and also to permit a better arrangement of the piping.

Automatic Control of Steam

The piping has been designed so that exhaust steam from the plant auxiliaries will be available to the turbines for greater economy. These turbines are now being operated by exhaust steam that has heretofore been lost to the atmosphere. Automatic control of the steam is provided, so that steam may be taken from the turbines at 10 lbs. or may be fed to them according to the demand, the steam pressure being held constant in the 10 lb. line by the turbine. The balance is maintained

by steam entering the turbine via the high pressure governors as called for by the gas pressure regulators. This is actuated by less than one-quarter of a pound variation in the gas pressure discharged from these compressors.

In the future, 125 lbs. steam will be extracted from the turbines for auxiliaries of the plant and at that time the sensitive control of steam to and from the turbines will be maintained at the 15 lb. point.

Bridge carrying Steam Piping from the Boiler Plant

A Smoot accumulator has been installed to maintain the uniform flow of steam at 5 lbs. to the water gas generators for gas making.

The compressors have a normal capacity of 1,500,000 cu. ft. per hour, and a maximum overload rating of 2,000,000 cu. ft. per hour at 7½ lbs. pressure. To handle the gas from the gas holders and to the system, two overhead gas mains were installed. These line are made of welded steel pipes, 42 in. and 48 in. in diameter.

High pressure steam piping has been installed throughout the plant to permit the greatest flexibility in operation at the time of installation of the high pressure system, which can now be installed without interruption to the normal operation of the plant. A permanent bridge has been erected across Duffield Avenue to the boiler plant, to carry this piping.

Indicating and recording instruments have been provided on each unit to keep a continuous record of all plant operations. These show flow of 125 lbs. steam, gas flow and condensing water flow. The amount of steam is also recorded to show the quantity delivered to the unit, or the quantity taken from it at the 10 lbs. exhaust pressure. This quantity depends on the demand for 10 lbs. steam required for gas making. These

Operating Machine Floor showing Centrifugal Compressors

instruments were furnished by the Republic Meter Company, and are of the electric type.

The lubricating oil system is unique in that oil is put into the system on the outside of the building. Storage tanks are located in the basement where a Westfalia oil separator, a totally enclosed type, also has been installed with motor and circulating pumps as part of the machine. Piping has been arranged for maximum flexibility so that oil from any or all machines can be continuously cleaned and recirculated, without interfering with carrying of the load. This has also been arranged so that by the mere closing or opening of segregating valves, any turbine oil may be drained, cleaned, placed in storage, or returned to the machine base without loss of oil on the floor or overboard. The separator is a very compact and efficient unit.

Continuous Carbonization of Finely Crushed Coal by Radiant Heat

BATTELLE Memorial Institute has cooperated with the Ohio State University Engineering Experiment Station in an investigation of the White process of carbonization of coal with Floyd B. Hobart, fuel chemist for the Battelle Memorial Institute, and D. J. Demorest, professor of metallurgy at the University, as investigators. These men have compiled the results of the tests which have been published as Bulletin 65 of the Station and entitled "Tests on the Continuous Carbonization of Finely Crushed Coal by Radiant Heat."

Coals from Ohio, West Virginia, and Illinois were used for the tests and dropped through the one-ton vertical retort of the Station. The by-product purification and recovery equipment of the Station was modified for the experiments. Coke, gas, and tar are the chief products of the process. The tar yield was found to be somewhat higher than that of the same coal under usual carbonization methods. The gas produced was little more than enough to supply the necessary heat for carbonizing. The residue as produced may be ground and used as a pulverized fuel or briquetted for domestic use.

Tables giving data on the analysis of the tar recovered and photomicrographs of the residue (coke) are included in Bulletin 65, copies of which may be obtained by addressing the Engineering Experiment Station, The Ohio State University, Columbus. The price has been fixed at fifty cents but a limited number are available for free general distribution.

Taking It On the Chin

THE telephone rang in the customers' service department of a certain gas company, and the following conversation ensued:

Customer: (Agitated and speaking rapidly) "You had a collector here yesterday morning and if he had shut off our supply of gas he would have spoiled the goods we had in process and caused some of our employees to get pneumonia. I would have brought suit against your company for damages, as your methods are unbearable. You should send your man at a respectable time. We will not mail our payments. We want a collector to call and receipt our bills during business hours."

Clerk: (Calmly) "I am sure there is some misunderstanding, as that is not our way of doing business. If you will give me your name and telephone number I'll look up the records immediately. You can hold the wire, if you desire, or I'll call you back."

Customer: (Giving name and telephone number) "Call me back but don't take all day to do it, understand."

Clerk: (After five minutes' futile search trying to confirm the customer's charges) "I have checked up on your assertions but can find nothing in our records to warrant them. One of our men was working in your neighborhood at the time, but no pressure of any kind has been brought on your concern for collection of bills."

Up Goes the Blood Pressure

Customer: (Madder than ever) "That's just about what I expected to hear from you fellows. You don't know what you're doing up there. You are nothing but a lot of dumb-bells. I could run your business better myself."

Clerk: (Unruffled) "Well, if what you claim proves to be true, I will be forced to agree with you, but our records fail to reflect any such action. Tell me, did you pay the man?"

Customer: "Yes. My brother paid him. If I had been there I would have kicked him out of the place."

Clerk: "Would you be kind enough to get the receipt and tell me the name of the collector? I feel it might have been an imposter who called."

Customer: "Hold the wire."

Clerk: "I'll be glad to."

Customer: (After several minutes had elapsed) "Hello. It was another company." And he abruptly hung up.

The above contact experience is typical of those featured by the American Gas Association in its Course in Employee-Customer Relations—an employee training program designed to build up in meter readers, collectors, telephone operators and others in public contact positions a higher level of skill in handling customers.

The employees enrolled in the course meet in conference groups and there discuss each case individually, and what the group as a whole determines to be the correct contact procedure in any given situation is then adopted as the best method to follow. When the experience just cited was brought up for discussion before a certain group, the members decided that anyone can strike a blow, but the one who can take it on the chin and keep his composure is the one who makes the best contact clerk. The young man who described his telephone talk with the irate customer won the commendation of the group.

"You've got to take it on the chin many times a day in this business," he informed the group.

The latest report from Association headquarters shows a total of 7,300 men and women contact employees of gas and combination gas and electric companies enrolled in the course. This is the largest number of employees ever enrolled in a single industrial course in the United States. Enrollments started in October, 1930, and have been coming in steadily ever since, despite bad business conditions and a general slicing of expenditures. Several companies which were among the first to enroll groups have set up additional groups and extended training facilities to include nearly every department of the business.

As originally introduced to the industry, the course was designed to occupy a training period of six months. Recently, however, the Association has issued a more ambitious training plan which includes the six months' course and in addition a concrete plan for continuing the group discussion work for another twelve months. As now constituted, the Association's plan provides material sufficient to put on a training program for a continuous period of from eighteen months to two years. Every phase of the conduct of group conferences, including helps for the leaders, illustrative cases and solutions, and definite programs, are covered in the new and enlarged plan. Full information may be obtained promptly from Association headquarters.

Five Men Read 342,784 Meters Without Error

FIVE meter readers in the Brooklyn Union Gas Company's employ read more than 342,000 meters during 1931 without a single error being found or recorded against them. For two of the men, it was their second year of errorless meter reading.

Here is the honor roll:

Name	*Branch*	*Meters Read*
G. P. Woll	Williamsburgh	91,645
N. A. Nilsen	Citizens'	89,109
C. V. Dillon	Metropolitan	86,496
S. A. Villani	Citizens'	37,917
W. Bartik	Williamsburgh	37,617
Total		342,784

Nilsen and Dillon were the men for whom 1931 was the second year in which they had no errors recorded against them. During 1930 they read a total of 161,335 meters without error, a record which they improved last year by increasing the number of correct readings to 175,605. Nilsen has been with the company since August 23, 1928, and Dillon since December 22, 1924.

In reading 91,645 meters without a mistake during 1931, Woll read an average of about 300 meters a day, or one meter every 1.6 minutes, assuming that he worked eight hours a day and about 300 days during the year.

The record is remarkable in view of the fact that a reader frequently is obliged to make two or more calls in order to get a reading, which greatly increases the amount of time required to get the reading.

Natural Gas in New York State

THE Public Service Commission of New York recently made public the report of its investigation into the natural gas industry in New York State. The report was instituted by the Commission on its own motion to develop the general situation in the natural gas industry.

The purpose of the Commission's investigation was to obtain as accurately and fully as possible all facts relative to natural gas production, its tranmission and distribution; the markets for natural gas and the effect on existing utilities of the introduction of natural gas into territory now supplied with manufactured gas; the usability of natural or mixed gas as compared with manufactured gas; the types of forms of rates most desirable for natural and mixed gas; as well as the practices followed in the leasing, operating and financing of natural gas production.

The proceeding was not directed to the existing rates, practices or capital structure of any particular company, or group of companies, and the report of the Commission deals primarily with the natural gas situation in the State of New York.

"The introduction of a competing natural gas supply in territory adequately served with artificial gas is uneconomical and undesirable from the public standpoint," says the report. "It should only be done where there is no other adequate way of extending the advantages of available natural gas to the public at reasonable rates.

"Where a city, situated a considerable distance from the gas fields, is supplied with artificial gas manufactured in a modern and efficient plant, the introduction of a straight natural gas supply is not economic or desirable unless the natural gas reserves are sufficient to take care of the probable demands for a considerable period," says the report.

Supply of Mixed Gas

"Where the local gas company has an up-to-date and efficient manufacturing plant," continues the report, "it may be advantageous to supply mixed gas, utilizing the present manufacturing plants, spreading the available supply of natural gas over a longer period, making possible the operation of development of the gas fields in a more economical manner, reducing transmission costs by utilizing existing equipment, and manufacturing artificial gas during periods of peak loads.

"There is a great lack of uniformity and simplicity in the forms of rates now being charged by utilities supplying natural or mixed gas," according to the report. "Rates must vary in different localities, but forms of rate schedules may well be standardized. Some promotional type of rate structure may be advantageous, but rates for each group or each block should not be at too great variance with the cost of service. Cost may not be the sole measure, but it should always be a very important factor.

"The suggestion that a 'therm' rate basis should be used where it is proposed to change from artificial to mixed gas with a high heating value may be acceptable under some conditions," continues the report. "But the cost of supplying gas does not vary directly with the heat content.

"Natural gas has twice the heating value of artificial gas and yet generally costs less per thousand cubic feet. Since rates must be based primarily on cost of service and not upon value of service, the change from a cubic foot basis to a therm standard would not solve the problem; the question still remains—What is a fair rate per therm?"

Exploration Speculative

"It is plain that under any circumstances natural gas exploration is extremely speculative," says the report. "Prospective investors in natural gas exploration or production enterprises should, before making any investment, acquaint themselves fully as to the exact holdings of the company in question, the location and status of its leaseholds, the reserve it controls, whether or not its gas wells and leaseholds are subject to competition or drainage by other operators and its market value for gas when produced.

"Daily open flow of any well is far in excess of the amount which can be continuously drawn from the well on the average and forms no criteria as to the amount of gas recoverable even though the well is not subject to competition and drainage by other wells."

The report states that "the organization of business corporations for the production and transportation of natural gas raises the question as to whether such com-

panies should be subject to regulation," and adds: "If not already subject to regulation under present laws, they should be made so. Elimination of competition by pooling of field interest under fair arrangements is preferable to unrestrained and destructive competition."

Declaring that the old sources of natural gas supply in New York State and northern Pennsylvania are not exhausted and should continue to supply large quantities for many years in the future, the report states that the geology of southwestern New York indicates that there are fair chances of new discoveries of natural gas in commercial quantities. Considerable exploratory drilling has been done, some of which has been moderately successful, but whether any other major pools will be uncovered is a question for the future.

"The rapid development of long distance natural gas transmission lines in recent years affects the question of reserves available for use in New York State and present and future possibilities as well as costs of importing gas from more distant fields in Pennsylvania and other states," it is stated.

"Many companies having to do with the sale, production and transportation of natural gas in New York are associated with other natural gas or artificial gas companies through stock ownership or control by holding companies; most of the gas imported from Pennsylvania is purchased at the state line from companies associated with the purchasing corporation; and most of the gas sold by natural gas transportation companies to utilities or sold by one utility company to another, involves a transfer between associated or allied interests.

"Natural gas produced in New York State and imported from Pennsylvania has averaged about 17 billion cubic feet per year during the last decade," states the report. "The production in the state has varied from somewhat less than 6 billion in 1927 to over 9½ million in 1930 when it reached the maximum for all time.

Production High in 1930

"The year 1930 was the only year in which the production in the state exceeded the imports. Of the 19,102,000,000 cubic feet of natural gas available in the state in 1930, 17,004,000 cubic feet were used for domestic purposes, 1,987,000,000 cubic feet were used for industrial purposes and 111,000,000 cubic feet were exported."

The Commission's report reveals that "the discovery and development of the New Wayne-Dundee field in New York and the Tioga field in Pennsylvania have provided additional supplies of natural gas which should be made available to portions of New York State heretofore supplied only with manufactured gas."

Continuing the report says: "It has been estimated that the Wayne-Dundee field has a proven area of 6,034 acres and gas reserves of approximately 16½ billion feet, of which some 4¼ billion are in the Wayne sweet gas area and 12¼ billion in the Dundee sour gas area.

"It has been estimated that the reserves in the Tioga field (as at present extended) amount to not less than 135 billion cubic feet and that recent drillings indicate additional reserves. Certain geologists believe this estimate to be excessive, and that the gas in the field is contained in relatively small pockets rather than in pore spaces in the rock. It is probable that the present estimates may be greatly changed, either up or down, by future developments.

"The greater part of the proven territory in the Wayne area is leased, or the well-output controlled, by the Belmont Quadrangle Drilling Corporation; and a considerable part of the balance of acreage in the competitive district is controlled by the Lycoming interest through contracts for the purchase of gas. Practically all production in the Dundee area is controlled by the Belmont Quadrangle Drilling Corporation.

"The present outlet for gas from the Wayne-Dundee fields is provided by the gathering system of the Belmont Quadrangle Drilling Corporation and its connections with the transmission lines of the Home Gas Company (Columbia Gas & Electric Corporation) at the east and the Iroquois Gas Corporation at the west. The Lycoming interests are now constructing a transmission line from Wayne to Penn Yan where it can connect with the present lines of the Associated Gas and Electric System now used for the transportation of artificial gas.

"The Lycoming interests and the Allegany Gas Company control most of the present production in the Tioga field. As the Lycoming has contracted for any excess gas the Allegany Company may have after supplying its present markets, it may be said that the Lycoming dominates the present production and that the greater part of the operation in this field will be eventually carried on by one company.

"The present outlet for gas from the Tioga field is provided by the transmission lines of the Allegany Gas Company, which has connected two of its wells into an old line leading to Addison, Corning, Elmira and Southport. The Lycoming company has installed gathering lines leading to its wells and is now constructing a 20-inch transmission line from the fields to the neighborhood of Syracuse where it may connect with the present transmission lines of the Niagara-Hudson system.

"Approximately 390 acres in the Wayne field are in a competitive area on which some 54 wells have been drilled. Based on the estimated reserves under this area, and the cost of the producing wells already drilled thereon, it is thought that it would be necessary to sell all of this gas to an average of $1.09 per M at the well, in order to avoid out-of-pocket loss on the cost of producing wells without considering the cost of dry holes or the expense of carrying unproductive acreage. This high figure is due, of course, to the great waste resulting from the drilling of unnecessary wells in a small area.

Effect of Additional Wells

"Where natural gas wells are drilled so close together that there is an overlapping of their economic drainage areas, the additional wells add nothing to the amount of gas that can be removed from a field; they only increase the rate at which the gas can be withdrawn, add to the possibilities of waste and damage due to flooding by salt water, and cause great economic waste because of the unnecessary investment.

"Millions of acres of gas lands, proven and otherwise, are held under lease in the State of New York, most of such land being held under an old form of lease wherein the land owner is paid some nominal sum, usually 25 cents per acre, as a delay rental until a producing well is drilled, after which he is paid a flat sum per year, ranging from $50 to $300 per producing well.

"A form of lease similar to the one prepared for use of landowners by the Federal Land Bank produces an equitable arrangement between the landowner and the lessor; the landowner being paid the usual delay rental until a producing well is drilled and then a royalty of one-eighth of the field price for gas for all gas produced from the well. This lease used in conjunction with a

pooling arrangement, under which all owners on whose lands producing wells are located are included in a pool and paid royalties based on their proportionate share of gas removed from the pool, irrespective of the well from which it was taken, should make possible the development and operation of a field in an orderly and economic manner and be more equitable to all concerned."

The report of the Commission also points out that "the cost of drilling and equipping a natural gas well is dependent on many factors," and says that "in the Wayne-Dundee field such average costs run from $6,200 per well in the Wayne area to $8,100 in the Dundee area; in the Tioga field the estimated average cost of producing wells including cost of dry holes, varies from approximately $25,000 to $28,000 per well and may even exceed these figures if the percentage of dry holes to producing wells is as large as it has been in the past. As the investment in wells, etc., must be amortized over their useful life the rate at which a field is depleted has a considerable effect on the cost of gas produced.

Transmission Lines Cost

"The costs of gathering lines and transmission lines of various sizes are dependent upon the conditions in each case, such as weight of pipe used, pressures to be carried, character of country through which they pass, etc. Costs for certain 8-inch lines laid in the last few years vary from approximately $5,600 to $8,000 per mile; estimated approximate present-day average costs per mile for transmission lines where there are no unusual conditions are $6,170 for 6-inch, $7,600 for 8-inch, and $10,500 for 10-inch lines; the estimated cost of the 20-inch line now being constructed from the Tioga field to Syracuse is approximately $25,000 per mile. These estimated costs vary from $30 to $205 per M cubic feet of daily capacity for a 100-mile line, depending on the size of pipe required."

Pointing out that "there are marked differences in the costs of producing natural gas, depending upon the conditions existing in each particular case," the report adds:

"There are great variations in the prices paid by utilities to different independent producers for natural gas purchased in the field; likewise in the prices paid for gas purchased from large producers, transportation companies and other utility companies.

"The unit cost of transportation of natural gas is dependent upon the conditions in each particular case, but is always greatly affected by the average load factor at which the line is operated. The higher the load factor, the lower the cost. The transportation of gas over long distances involves large investments which must be amortized during the useful life of the gas fields from which it leads. Thus the rate at which the fields are depleted also influences the cost of transportation.

"In addition to the natural gas transmission lines of the Iroquois Gas Corporation, the Pennsylvania Gas Company, the Home Gas Company, and various others, there are quite extensive lines in New York, controlled by the Niagara-Hudson system and by the Associated Gas and Electric System, which are now used for the transportation of artificial gas. With the completion of the lines now being constructed from the Wayne and Tioga fields by the Lycoming interests, those should be available for natural or mixed gas and, with the construction of several comparatively short links, would furnish a connection between these fields and many industrial cities extending almost across the length of the state."

Certification of Products

A FAR-REACHING movement to stabilize the marketing of industrial products by means of industry-wide guarantees administered by trade associations and professional societies is revealed in the recent publication by the American Standards Association of a report on the first comprehensive survey of the economic importance of certification and labeling activities in the United States.

The report, by Dr. P. G. Agnew, secretary, and J. W. McNair, staff engineer of the Association, shows that manufactured commodities valued at over a billion dollars were sold last year by more than 50 industries under some plan of guaranteeing the quality to purchasers. These industries ranged from lumber to mirrors, and from heating systems to drugs.

The report also covers agricultural commodities and dairy products, over four billion dollars worth of which were sold under guarantee last year by means of grading, labeling, and certification. Part of this, for example the classification of eggs as grade A, B, or C eggs, and the classification of milk as certified, grade A, or grade B, is in many cities and states mandatory under the law.

The lumber industry furnishes an outstanding example of the extent to which this new type of marketing has permeated in industry, the report shows. At the present time 35 per cent of all the softwood cut in the United States is marked with a definite grade showing its quality, which the manufacturers guarantee to the purchasers. Nearly 50 per cent of all hardwood is sold under similar guarantees. Over four billion board feet of hardwoods are graded and certified annually.

Gas-burning cooking and heating appliances, valued at $375,000,000, and bearing the label of the American Gas Association guaranteeing compliance with the Association's safety requirements, are sold annually. This represents approximately three-quarters of the total annual production of gas appliances.

The Underwriters' Laboratories also guarantee compliance of many types of products with safety requirements. The Laboratories inspect and label electrical appliances, gas and oil appliances, automotive appliances, and fire protection and burglary protection appliances.

The American Medical Association certifies to physicians the compliance of certain drugs with the requirements of the United States Pharmacopoeia, including them in its book *New and Non-Official Remedies*. A similar plan aimed to give the ultimate consumer greater security in the purchase of branded foods was recently put into operation by the Medical Association.

Other commodities which are sold under grade mark or certification guaranteeing compliance with standards are:

flooring
apples
biological stains
foods and medicines
insecticides
farm and dairy products
preserves
cottonseed products
wall paper
brick
concrete mixers
heating systems
clay tile
electric wiring installations
concrete reinforcing steel
roofing materials
oil field equipment
feed stuffs
diamond core drills
malleable iron
mirrors
hickory handles
tissue paper
automotive devices and materials
automobile rims
mattresses and pillows
paper articles
steam boilers
tractors
paper bags
elevator safety devices
colored fabrics
brooms

Pipe Line Review Notes

W. S. JOHNSTON

Mechanical Engineer

IN 1931 there were laid more than 9000 miles of natural gas pipe lines costing approximately $450,000,000. Included in this figure are three lines originating in the Amarillo field of the Panhandle section of Texas. The largest line is that built and completed last Fall by the Continental Construction Company for the Natural Gas Corp. of America, a concern jointly owned by seven companies who financed the project entirely by themselves without recourse to the public.

The total cost of the finished line with its compressor or booster stations will approximate $75,000,000. It is 975 miles long and so cost an average of nearly $75,000 a mile. The line, which is made of 24 inch diameter steel pipe, of which 220,000 tons were used, crosses portions of the states of Texas, Oklahoma, Kansas, Nebraska, Iowa, and Illinois. In general, the line extends through open farming country reclaimed from the early prairies. The soil being alluvial did not present the difficulties to excavation that would be experienced in mountainous country, though there are some so-called "Bad Lands" in western Oklahoma and southern Kansas on the route of the line. The depth of the ditch, dug by machine, is normally 54 inches, affording a coverage of 30 inches over the buried pipe, and its width is 36 inches. It has been estimated that 75 million cubic feet of earth were removed and replaced in laying the Continental line. Back filling this quantity is likewise a machine operation. The entire project required eighteen months for completion and used labor equivalent to 2500 men working every day for a full year.

Pipe Protection

The line consists of a single buried pipe as it crosses the country, and, each length of pipe, about 40 feet long, is welded on each end to the adjoining length, provision for expansion at predetermined intervals being afforded by the use of sleeve couplings between lengths. Deterioration of the pipe is obviated by coating the exterior with non-corrosive paint. In some sections, due to soil conditions, it was necessary to wrap the pipe in especially impregnated felt which was sealed with hot asphalt in the field before laying in the trench.

The Continental line crosses over 100 good sized streams including the Canadian, Arkansas, Des Moines, and Mississippi Rivers. The crossings are effected by burying the line below the bed of the stream and from four to ten pipes are used for protection against possible damage to a fewer number.

To avoid any loss of gas from the line after it was covered over in the trench and placed in service, the line was thoroughly tested before the trench was back filled. The first test was made above ground by coating the welded joints with liquid soap, applying an air pressure of 100 lb. per sq. in. and inspecting the joints for bubbles. The second test was more severe and was made after the pipe had been lowered into the trench. With an air pressure of 100 lb. and gages set along the line, the pipe was required to show no appreciable loss in pressure for 24 hours. The final test was made after completion of the line and consisted in applying 600 lb. pressure with natural gas.

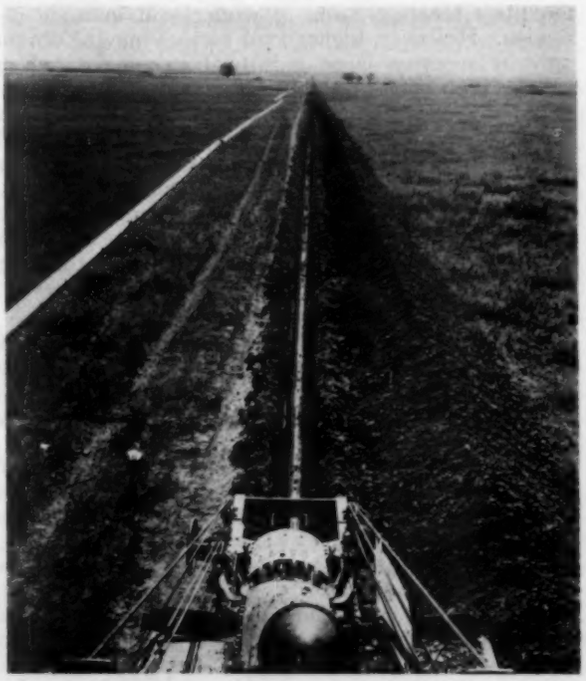
The Amarillo field, of which the Continental line is one outlet, affords a reservoir of 1 million acres of what is known as "sweet gas" land, that is, the gas does not require any refining process before it is sent out on the line. The known extent of the field in Carson, Gray, Moore, and adjacent counties leads geologists to estimate the gas reserves of the field at 8,000,000 million cubic feet.

Compressor Station Data

The capacity of the Continental line is 175 million cubic feet per day. The rock pressure in the gas sands averages 950 lb. per square inch, which is reduced to 600 lb. before initially entering the line. To keep up the line pressure, compressor stations are located approximately every 100 miles and altogether there are installed nearly 100,000 horsepower of compressor capacity in the ten line stations. The Fritch Station on this line is the largest gas-driven compressor station yet built anywhere and has twelve 1250 hp. units.

The next longest line originating in the Amarillo field is that of the Panhandle Eastern Pipe Line Company. It consists of 867 miles of 22 inch and 24 inch pipe. The line extends across parts of the states of Texas, Oklahoma, Kansas, Missouri, Illinois, and Indiana to connect at the Ohio border with the existing pipe line system of the Columbia Gas & Electric Corp. In Kansas it picks up gas from the Hugoton field in the southwestern part of the state.

The daily line capacity is 160 million cubic feet of gas. This amount will be available to a large part



Machine-dug Trench ready to receive Pipe Line

of the Middle West industrial area of the country centering about the Columbia Corporation's distribution system.

The third line from the Amarillo field is 800 miles long and is a 24 inch line extending across parts of the states of Texas, Oklahoma, Kansas, Nebraska, Iowa and into Minnesota. The line capacity is about 115 million cubic feet per day.

While some of the gas lines from mid-continent area are the longest so far constructed, the highest pressure line is nearing completion in the southwest. The line of the Western Gas Company has been designed to operate at 900 lb. pressure. It is twelve inches in diameter and extends 275 miles from the present terminus at El Paso to Douglas and Bisbee, Arizona, and to Cananea, Mexico. The line will serve copper mining and smelting companies along its route as well as the Arizona Edison Company and the adjacent intervening territory.

Four compressor stations will keep up the line pressure. The reputed cost of the line and stations is $6,000,000.

The foregoing brief description of some of the recent long pipe lines gives one an idea of the enormity of these projects. A line 1000 miles long and 2 feet in diameter is a reality. Probably there will not be built lines of greater length, unless new gas deposits are found at greater distances from present markets. Whether 1000 miles is the maximum economic length of line remains to be seen. Pipe of greater diameter can be fabricated, but again there is a question as to whether a market is available for the immense quantity such sizes can deliver.

Influence of Load Factor

Of course, many carefully made calculations as to pipe line revenue have failed to materialize in the case of the more recent lines because of the depression. Probably many of the lines are operating at a load factor of only 30 to 50%, particularly during the summer months. Heating loads in winter will increase these figures. However, higher load factors may be obtained only by securing large industrial customers and they can be maintained only by increased industrial activity over present figures. Doubtless many of the large capacity lines will not be up to their full capacity for a number of years as they have been designed to care for projected requirements years hence predicated on a greater annual rate of growth in demand than has obtained in 1930 and 1931. There can be no question but what there will be eventually a market for all the gas they can deliver as long as the United States is an industrial nation.

However, with past experience in the construction of long pipe lines through all kinds of terrain under various climatic conditions, there are no natural difficulties awaiting construction in the future that have not been met and overcome in the past. As in all projects involving the handling of large quantities, machinery has been developed that minimizes the amount of manual labor required to lay these long pipe lines. Possibly if human efforts alone were available the expense involved in their construction work would make the cost of construction prohibitive. Only by having recourse to machines has it been possible to undertake and accomplish such gigantic projects at reasonable expense. The illustrations accompanying this article clearly show the part played by self-contained, mobile field equipment.

Probably one of the questions most often asked in connection with natural gas pipe lines is how long will the supply of gas continue. Like all natural resources that are not self-replenishing, there is a definite life span depending upon how fast these resources are used up. On the other hand there is always the possibility that new reserves may be found at lower levels. This phenomena is well illustrated in the Appalachian field. At one time it was thought this field had been exhausted as all the gas had apparently been drawn off. But the wells only went down less than a couple of thousand feet. As drilling experience was gained in other fields requiring deeper wells, the lower sands of the Appalachian field were opened up at greater depths and more extensive pools were found. It is now estimated the known reserves will last for 25 years.

Life of Largest Field

In the Amarillo field, it is conceded the life of the now known proven area will be 35 years under a draw-down based on the projected demands of the present lines. This is the largest known field. However, new reserves may be found that will extend the life of the field.

As an example of the rapidity with which new reserves are being added to the present known supply, the Hugoton field in southwestern Kansas may be cited. Although about a year old, this field has already proven to be the second largest in the country with proved reserves of 6,000 million cubic feet. Additional drilling and development work will probably increase this estimate. The present known reserves in this field alone are sufficient to take care of a withdrawal of over 500 million cubic feet per day for thirty years.

Of course, the economics of an investment in a pipe line from a field of known reserves, or from certain wells in the field, require that provision be made to retire the lines considerably before the reserves are exhausted. An idea has already been given of the large investment required for some of the lines described. In the Amarillo field it costs $18,000 to $20,000 to drill a well. Down in southwest Texas the cost is $12,000, while in western Oklahoma it is more expensive, $50,000 to $75,000.

The cost of transporting gas in large quantities over great distances is hardly sufficiently established to warrant publication of the figures. None of the large lines are operated anywhere near their designed capacity. Fixed charges are at the maximum. Compressor capacity is largely unused. It will be several years before representative costs will be available, those now at hand do not reflect true costs, just as present revenue is not indicative of what will be obtained in the future.

Looking into the future, it would seem that pipe lines have some advantages over electrical transmission lines in the same territory. It has been calculated that on the latter it costs $190 to transmit a million kilowatt hours. A gas line will handle the equivalent amount of energy at an expense of $65. It is entirely possible the field of electrical generation may be revolutionized in certain sections of the country where gas is available, superpower central station at fuel supply sources giving way to multiple plants at or near load centers, fuel gas being piped to them. With the increase in electrical power demands ever present in normal times, it would seem there is a large potential market for natural gas in the making.

Insulation effects large savings in the heating bill of this fine Grand Rapids home

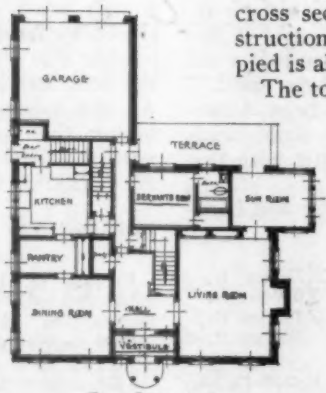
Does it Pay to Insulate?

GEORGE H. WARING
Consulting Gas Engineer

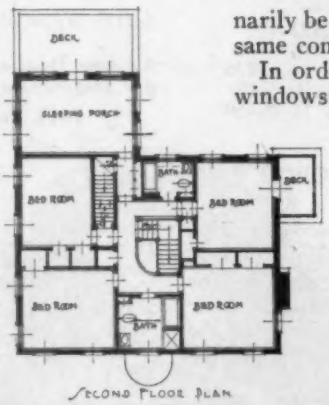
AFTER living in an uninsulated home for two years and using manufactured gas for house heating, it was found to be somewhat expensive. Four years ago, it was decided to build an insulated house that would reduce the gas consumption to about half of what an uninsulated house would use.

Nearly all of the insulating materials on the market at that time were found to be good non-conductors of heat, but too thin. Any insulating material to be of much value, should be at least one and one-half inches thick and so applied that no air leaks would be found at joints. The best place for this insulating material is between the studding or in place of laths or both. In looking around for some insulating material to put in the four inch space between the studding, it was decided to fill this space with granulated cork, also to use cork board one and one-half inches thick in place of laths on the outside walls. Two inch cork board was used on the ceilings of the second floor with four inches of granulated cork on top. It will be seen from the above that all the outside walls of the house have five and one-half inches of cork insulation and the ceiling of the second floor has six inches.

This construction is shown by the cross section sketch on the next page. The construction of the uninsulated house previously occupied is also shown by this cross section sketch.



FIRST FLOOR PLAN
RESIDENCE — MR. & MRS. GEO. WARING
GRAND RAPIDS, MICH. U.S.A.
CHARLES NORTON JR. ARCHITECT.



SECOND FLOOR PLAN

The total cost of this cork insulation was $833.96, of which the ground work cost $133.96. It required for this job 5886 board feet of cork board and 7028 pounds of ground cork. The total weight of cork was 13,562 lbs. On account of its bulk it filled a large freight car.

A very satisfactory and inexpensive insulation could be obtained by using just ground cork between the studdings and on top of the ceiling of the second floor. While the cork board was an added expense of $700.00 in this case, it has made a much better job. So far, the ground cork seems to be free from insects and moisture that would ordinarily be found in sawdust, and it seems to be in the same condition as when installed.

In order to reduce the window radiation, double windows were installed with metal weather strips on the inside windows. Five of the seven outside doors are double, with metal weather strips on the inside doors.

After the first three heating seasons, it was found that there was an infiltration of cold air between the window and door frames and the brickwork. To overcome this, a plastic cement was injected into this space completely filling it. This plastic material was injected with a gun, similar to an alemite gun used for lubricating automobiles. Dur-

ing the following heating season quite an improvement was noted in that the amount of gas required per degree day was less.

To insure proper ventilation, an exhaust fan is operated in the kitchen during the cooking of all meals. A large fireplace in the living room draws air from this room at all times when the air in the room is warmer than the outside air. There is a draft break in the flue pipe of the furnace which draws air from the basement continuously. Fresh air from the outside filters in through air leaks and opened doors to take the place of the air exhausted from kitchen, living room and basement. Once each day the house is thoroughly aired by opening doors and windows and operating the exhaust fan in the kitchen. Windows are opened in all occupied bedrooms at night. Most members of the family sleep outside the house on a sleeping porch.

A hot air gas furnace was installed with two 150 cubic feet burners. This furnace gives good circulation of air and humidification, as it is equipped with a humidifier and there is a hot air register in each room and a cold air return from each room to the furnace. One burner is kept shut off except in very cold weather.

Thermostatic control keeps all rooms at the same temperature and by means of a clock the temperature is maintained at 70° in the day and 60° at night.

By having a cold air return from each room, doors may be closed without affecting the circulation and at no time are cold drafts felt on stairways or elsewhere.

This house has been occupied since 1927 and it has demonstrated that the heat losses are less than half what they would have been had no insulation been used.

It may be well to describe this house. It is an American Colonial house, rectangular frame with brick veneer and slate roof; full basement and attic with two stories, 10 rooms and three bathrooms.

The following dimensions exclude the attic and basement:

The cubical contents of this house	=	26,750 cu. ft.
Gross area outside walls	=	2,919 sq. ft.
Net area outside walls 2919-726 glass area	=	2,193 sq. ft.
Glass area full casement openings	=	726 sq. ft.

Using Mill's rule for calculating required steam radiation:

$$\text{Sq. ft. of Steam radiation} = \frac{G}{2} + \frac{W}{20} + \frac{C}{200}$$

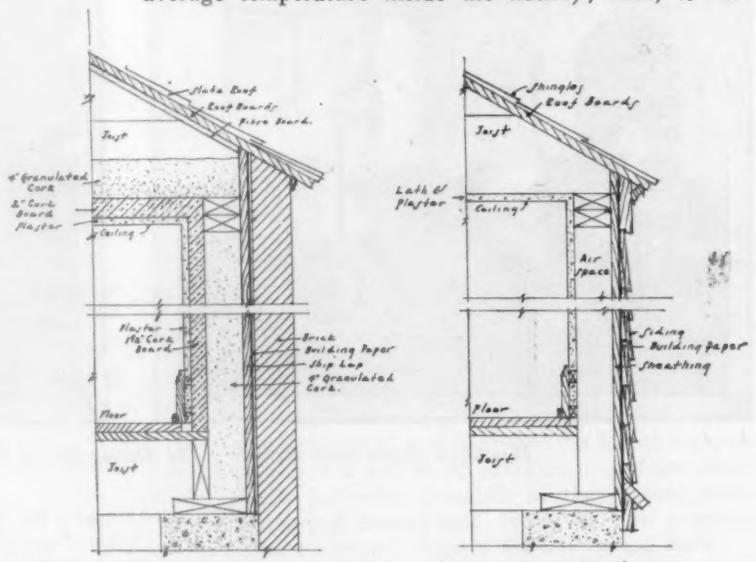
Where G = Glass area in sq. ft. 726
W = Net exposed outside wall area sq. ft. 2,193
C = Cubical contents of building cu. ft. 26,750

$$\frac{726}{2} + \frac{2193}{20} + \frac{26750}{200} = 606 \text{ sq. ft. of required steam}$$

radiation for an *uninsulated* house. It requires 50% more sq. ft. radiation for hot water therefore 606 × 1.5 = 909 sq. ft. of required hot water radiation for same *uninsulated* house.

In order to arrive at the comparative efficiency of the insulation installed, it was decided to use the degree day as the unit of measurement.

The degree day as used is a figure which is the product of one day, times the number of degrees the average mean temperature outside is below 65° F. (the average temperature inside the house); thus, to determine the number of degree-days per month, subtract the mean daily temperature from 65° and multiply by the number of days in the month.



Typical Construction of Insulated and Uninsulated House

For example: If the mean daily temperature is 40° and there are 30 days in the month, then 65 — 40 × 30 = 750 degree days for that month.

The normal degree days per heating season in Grand Rapids are 6534 based on the normal temperature as shown by the U. S. Weather Bureau. The degree days used in this test are the actual average degree days for the four heating seasons in which the test was made. As the average temperature during this period was higher than normal, the degree days were less than normal. 6404 were the actual average degree days for the period of test.

Estimated 530 B.t.u. Gas Required Annually to Heat this Home Uninsulated

Factors .18, .12 and .40 cu. ft. used below are average results obtained over period of years in heating *uninsulated* houses with 530 B.T.U. Gas.

6404 degrees days × 606 sq. ft. required steam radiation × .18 cu. ft. per degree day = 698,548 cu. ft.

6404 degree days × 909 sq. ft. required Hot Water radiation × .12 cu. ft. per degree day = 698,548 cu. ft.

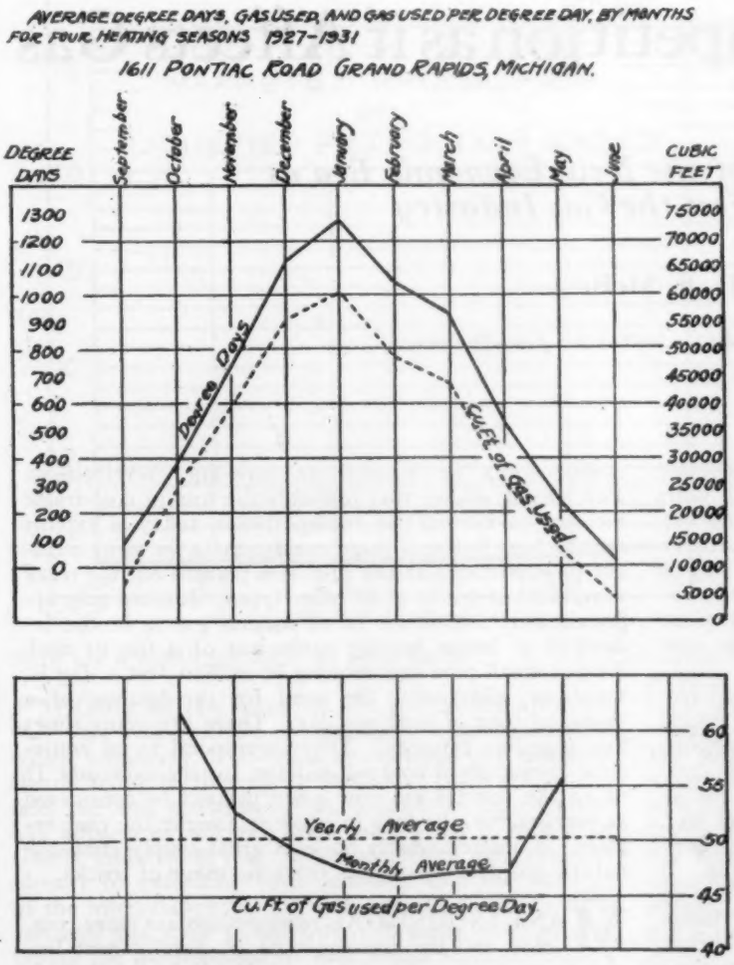
$$6404 \text{ degree days} \times \frac{26750 \text{ cu. ft. content}}{100} \times .40 \text{ cu. ft. per}$$

degree day = 685,228 cu. ft.

Average Degree Days per Month, Gas Used and Gas Used per Degree Day for Four Heating Seasons 1927 to 1931

1611 Pontiac Road, Grand Rapids, Michigan

	Degree Days	Gas Used	Cu. ft. per degree day
September	81.0	6,725	83.02
October	395.2	24,525	62.05
November	749.3	39,525	52.74
December	1122.2	55,625	49.56
January	1279.5	60,825	47.53
February	1042.2	48,550	46.58
March	926.4	43,625	47.09
April	540.0	25,500	47.22
May	243.4	13,600	55.87
June	24.8	4,350	175.40
	6404.0	322,850	50.41



Using the required radiation for an uninsulated house gives the following:

50.41 ÷ 606 = 0.0831 cu. ft. gas per degree day per sq. ft. steam radiation.

0.0831 × 530 B.T.U. = 44 B.T.U.s per degree day per sq. ft. steam radiation.

50.41 ÷ 909 = 0.0555 cu. ft. gas per degree day per sq. ft. Hot Water radiation.

0.0555 × 530 B.T.U. = 29.4 B.T.U.s per degree day per sq. ft. Hot Water radiation.

50.41 ÷ 267.50 = 0.1884 cu. ft. of gas per degree per 100 cu. ft. building content.

0.1884 × 530 B.T.U. = 99.8 B.T.U.s per degree day per 100 cu. ft. building content.

To heat this house, it requires one B.T.U. per degree day for every cu. ft. of building content. For the average uninsulated residence of this type, it requires at least two B.T.U.'s per degree day per cu. ft. of building content.

Estimated cu. ft. of gas per degree day per sq. ft. steam radiation *uninsulated* house	0.18 cu. ft.
Actual cu. ft. of gas per degree day per sq. ft. required steam radiation *insulated* house	0.0831 cu. ft.
Estimated cu. ft. of gas per degree day per sq. ft. hot water radiation *uninsulated* house	0.120 cu. ft.
Actual cu. ft. of gas per degree day per sq. ft. required hot water radiation *insulated* house	0.0555 cu. ft.
Estimated cu. ft. of gas per degree day per 100 cu. ft. of building content *uninsulated* house	0.400 cu. ft.
Actual cu. ft. of gas per degree day per 100 cu. ft. of building content *insulated* house	0.1884 cu. ft.

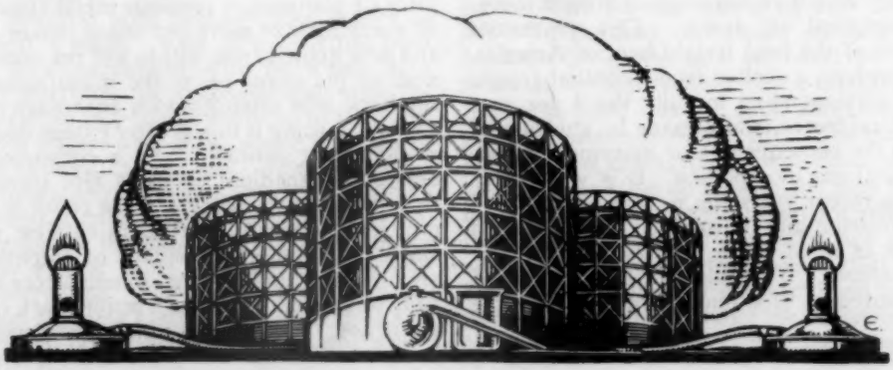
It will be seen that the above figures indicate that the gas used to heat this building was less than half required to heat an uninsulated house. In other words had this house not been insulated, the gas consumption would have been at least twice what it was. By insulating at least 322,850 cu. ft. of gas at 70c per thousand cu. ft. = to $225.98 was saved. This represents a return of 27% on the cost of the insulation, which has been paid for in the saving of the past four years.

In addition to the saving in gas by insulation, there are other benefits. The temperature of the house is more uniform in all parts. The required B.T.U.'s are less, therefore the hot air is at a lower temperature eliminating any odor from overheated registers. In summer insulation tends to keep the house cool during the hot part of the day. In short, an insulated house is more comfortable during all seasons of the year.

The insulation material and its location in this house has reduced the fire hazard which is great in the average uninsulated home where the 4" space between the studding is an open air space. The cork board seemed to be a better material and more rigid than ordinary laths on which to plaster.

Gas House Heating on a large scale can be assured when the general public has been educated to properly insulate their homes. This education can best be done by the architects with the co-operation of gas companies.

It has been demonstrated by this practical test that by proper insulation the fuel consumption on any given house can be reduced fifty per cent when compared with a similar house not insulated. *IT DOES PAY TO INSULATE.*



Commodity Competition as it Affects Gas

Characteristics of the New Economic Era as They Affect the Gas Industry

R. S. McBride

Consulting Editor, American Gas Journal

A NEW ECONOMICS now prevails, the economics of surpluses. Within the past ten years there has very definitely closed the former era, that in which the economics of deficiency was dominant. Many signs demonstrate the very fundamental way in which these changes have taken place. But few industries have, however, fully appraised them and taken proper steps to conform with the new system that must be accepted.

The gas business, though nominally a protected monopoly for each company within its area, cannot escape the consequences of the changed situation. Monopoly, insofar as it exists, is that which protects against competition in kind. There is no protection for the gas industry against competition of unlike types. This fact, in a general way, has sometimes rather definitely been recognized in engineering and management planning. It has, however, not been widely enough accepted nor its consequences accurately enough measured. Inter-energy competition, like inter-commodity competition, demands a new system of judgment of many situations that are today pressing for settlement.

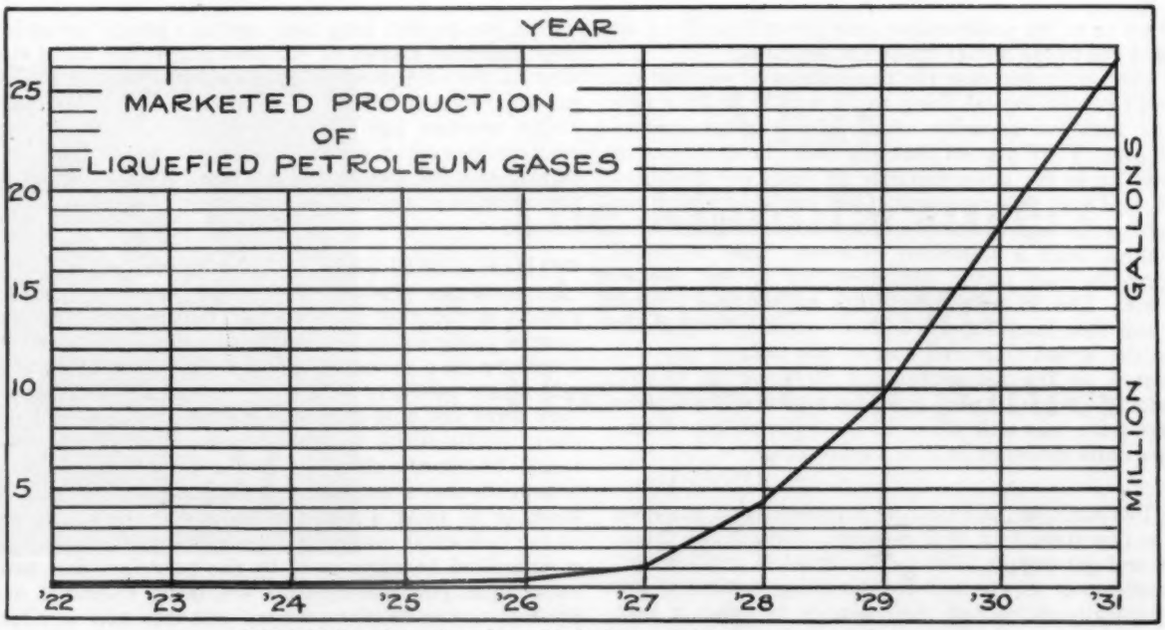
INTER-COMMODITY COMPETITION has taken queer forms in recent years. Remote, even unnoticed and unsuspected factors, often enter to wreck plans of well-organized and seemingly well-founded industry. We need not go out of the field of the gas business to discover one of the most appalling of such factors, if we judge it from the other man's point of view. The invasion of natural gas on a huge scale into the competitive heating field is the development referred to.

Railroad men have long noted, talked about, worried about, and tried to meet the problems of truck and bus competition. It is estimated by one of the most responsible students of highway trucking that at the present time approximately 25 billion ton miles of freight movement are accomplished by truck. This represents roughly 4 per cent of the total freight haul of America. It represents, therefore, a decline from potential freight business by rail corresponding to fully the 4 per cent indicated. Some reference is also made by students of transportation to the consequences of movement of petroleum and natural gas by pipe line. It is well recognized that during recent years the increase in railroad movement of petroleum and its products has only been about 10 per cent as rapid as the increase in the quantity of goods produced. The balance of the increased production has moved by pipe line or truck, mainly the former.

Little attention has been given to the corresponding consequences of natural-gas pipe-line development. Few people realize that probably the loss in coal traffic incident to natural-gas transportation today is rapidly approaching in ton-mileage consequences the same measure of importance as has just been pointed out for truck movement of goods of all other types. It takes only approximately 16,000 cu. ft. of natural gas to be the industrial or house heating equivalent of a ton of coal. Even a small pipe line moving 16 million feet a day is, therefore, eliminating the need for the hauling of a thousand tons of coal per day. There are many times that pipe-line capacity. They correspond to an equivalent shrinkage in coal ton-mileage for the railroads. If all of the natural gas now being utilized be considered as competitive, the loss in revenue freight for coal replaced is unquestionably quite as great simply from the natural-gas development as from the usage of trucks.

MANY INDUSTRIAL relationships are more complex and the consequences of development less easy to measure and to foresee. For example, there is one case in which mere management decision of a Canadian mining corporation is likely to determine the profit prospects of two important American subsidiaries of a chemical company. This case, because the chain of circumstances is so long, is worthy of note, even though it has nothing to do with the gas business. The story is something like this—

According to the relative price of copper, nickel, and platinum, International Nickel Company determines as a mere management judgment from what level in its Frood mine it will take its ore. If the decision favors the use of ore from low levels the result is a production of larger quantities of copper, platinum, and silver for each ton of nickel made. The marketing of this platinum into a comparatively restricted consuming market might, and actually did, materially reduce the market price of platinum, a precious metal commonly regarded as worth $100 or more per ounce two or three years ago and now quoted from $30 to $40 per ounce. With platinum at the lower price, the manufacturers of contact sulphuric acid promptly took advantage of this metal as a catalyst, using it to a greater extent than was formerly economically desirable. As a consequence, the newly developed vanadium catalysts find increasing difficulty in dominating the market. The result is that one of the principal owners of vanadium catalyst patents and its affiliate, an important builder of sulphuric acid plants, are no longer under these circumstances able as successfully to expand their construction work or their catalyst marketing. The interlock and inter-dependence, though rather remote and usually not noticed, is very real. And



1922-1930 Based on data from U. S. Bureau of Mines; 1931 estimated

there are a multitude more of such cases.

CHOICE of raw materials for gas making affords a very real example of commodity competition with which engineers of every manufactured-gas company should today be thoroughly familiar. But even in this field the full consequence of commodity development has apparently not yet been felt. And it should be clearly understood that the consequences give evidence already of extending very definitely into the question of the interrelationship between natural gas and manufactured gas, even to the extent in some cases of curtailing the development of natural-gas markets.

The most efficient methods for refining of petroleum today require the cracking of some of the lighter fuel oils in order to increase materially the yield of gasoline. Only a few years ago it was common for 20 to 25 gallons of gasoline to be produced per 100 gallons of crude oil treated. Today the average is fully twice that percentage. But accompanying the gasoline there is the gaseous product of cracking. The heating value of the gas so manufactured at petroleum refineries today is in the aggregate for the United States greater than the heating value of the coal gas manufactured. The combination of this refinery gas with the propane and butane available from natural-gasoline manufacture gives an aggregate gaseous fuel supply as a byproduct of petroleum greater in heating value than the combined output of all kinds of coke-ovens, coal-gas, water-gas, and oil-gas plants of the country.

Much of this fuel has been burned under boilers in the plants where it is made. Very little of it has been utilized in any way comparable with its worth in a competitive fuel situation. It is unbelievable that the petroleum industry can indefinitely continue to burn this gas under its own boilers and stills, where it is worth about 10 cents a million B.t.u. or less. Just beyond the refinery fence, figuratively speaking, the gas is worth from 50 to 75 cents a million B.t.u. in many industrial areas. In the aggregate the difference between refinery value and nearby market value amounts to many millions of dollars every year. The gas industry can, therefore, safely expect that this gaseous fuel is going to find a market more nearly commensurate with its worth.

That this is not an academic question has been widely recognized. A number of important engineering groups have made careful studies of the means for adapting refinery-byproduct gas to use as a part of city supply. The work by U.G.I. engineers at Chester is generally recognized. Just lately there has been announced a plan for developing this method on a scale of approximately 4 million cu. ft. of refinery-byproduct gas per day for the Brooklyn system. Baltimore, too, is already using refinery gas as a very important part of its fuel supply. Apparently these are but three examples of the many which should be anticipated within the near future.

NATURAL GAS engineers may feel that this development of a petroleum refinery has but little significance for them. Such is not the case. The competition between natural gas and refinery-byproduct gas is already very real, and it is prospectively much more serious than has been usually understood. Take one important eastern city where an analysis of this competition was recently made as an example of the possibilities. There the competition was three-cornered, and very interesting.

The three gases available were carburetted water gas, natural gas in a transmission main a comparatively short distance away, and a potential supply of refinery-byproduct gas deliverable either by pipe line or by water in pressure-tank barges. When the problem first presented itself the city was using only carburetted water gas. To carburet this supply either gas oil or heavy bunker "C" grade fuel oil could be utilized. With either as the carburetting oil the capacity of the existing water-gas plant was not quite adequate to maintain the peak requirements of the city. The question confronting the local management was—Shall we install a new machine, shall we tie in with the pipe line less than 50 miles away, or shall we contract for refinery gas? Fortunately this company had abundant credit, affording sufficient funds either to buy additional equipment or to build a small connecting transmission main with money at reasonable price. Hence the choice between the three sources of additional supply rested primarily on the

question as to the comparative cost per million B.t.u. of finished gas in the holder ready for send-out.

In this particular case the proponents of natural gas argued that the logical thing to do was to build a pipe line of sufficient capacity wholly to replace manufactured gas. They argued that gas could be delivered at the city limits for approximately 35 cents per thousand cu. ft. and that this represented the equivalent of a net holder cost of approximately 35 cents per million B.t.u. In making such a statement, however, they neglected the capacity-load factor considerations on the needed pipe line. The 35 cents which they quoted was correct only for base-load supply without seasonal variation. When the actual delivered cost of the natural gas was calculated on the assumption of replacing all of the manufactured gas it was quickly discovered that the average price was well above 60 cents per million B.t.u., a figure quite different in local significance.

PETROLEUM INTERESTS entered this situation at this stage in a dual capacity. Noting the threat of natural-gas supply, either for complete replacement of water-gas or as a means for enriching instead of oil, they naturally sharpened their pencils to figure a new and more favorable contract for their oil customer. They offered three alternatives. First they offered to reduce the price for gas oil, a modification amply justified by the current changes in the oil market. In the second place, they offered bunker "C" oil delivered at the works bunker, which was near enough tidewater to permit barge delivery, at a price of approximately 1.75 cents per gallon. In the third place, they offered the delivery of liquefied petroleum-gas byproducts of their refinery operation at a price for base load purposes approximately equal per million B.t.u. to the natural-gas supply, namely 35 cents per million B.t.u. delivered at the wharves of the gas works.

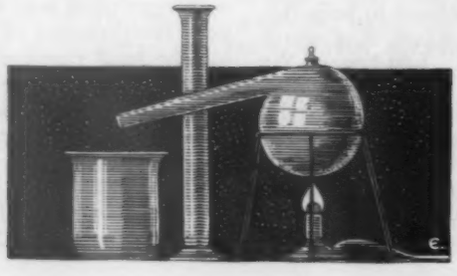
This third proposal was one of considerable interest. It involved a novel type of transportation which bids fair to become an important factor in some parts of the United States affecting the gas industry. It was proposed to build aboard a tanker barge a group of pressure containers like those customarily used for handling or storage of propane and butane. These unit containers were to be charged under pressure at the refinery with the refinery-byproduct gas. They were to be hauled by water a distance of nearly 100 miles and unloaded through pressure pipe lines into the high-pressure storage tanks proposed for the gas works. As indicated above, the delivered gross cost for this gas, eminently suited as an enricher for the local situation, was prospectively approximately the same as the base-load price for natural gas.

It is of no concern here to record just how this particular local management has temporarily settled its plans for purchase of enricher gas or oil. The important fact to record is that it required a careful engineering study, not only of the present-day situation, but of the prospective long-time contract prices for at least four different classes of enricher before the chief engineer of the enterprise in question was justified in making any recommendation to his management. He had to judge whether gas oil, bunker "C" fuel oil, liquefied refinery-byproduct gas or natural gas would enable him to maintain the average holder cost of his send-out at a minimum over a period of some years to come.

THIS COMPETITION between petroleum and natural-gas products has taken on many different aspects in different parts of the country. In a few instances public utility enterprises have actually been confronted with a threat of direct competition of liquefied petroleum products for their industrial customers if they were not able themselves to absorb and utilize in their public-utility systems these important gaseous fuels. Obviously, this competition is very serious when it requires only a nominal new investment of a few hundred, or at most a few thousand dollars on the part of the industrial customer. Such threat of competition may, indeed, be aggravated by the very fact that many natural-gas pipe-line systems are being extended over great distances to carry natural gas into new territory. It must be recalled that every time the production and marketing for city supply of an additional 100 million cu. ft. of natural gas is accomplished there will become available for the fuel markets of the country a corresponding very considerable quantity, not only of natural gasoline, which is non-competitive with city gas, but also propane and butane, which *are* directly competitive.

The interests of the gas business and of the petroleum industry are being constantly forced closer and closer together. A recent evidence of this is given by the announcement of the affiliation on an enlarged scale through certain parts of the east of the Columbia Gas and Electric Company with the Standard Oil Company of New Jersey. There are likely to be still more affiliations of this character because of the constantly increasing mutuality of interest. Engineers, as well as managements, must take into account this fact. It need not be assumed that the affiliation will become as close as actual interlocking directorates, exchange of stock, or jointly owned subsidiaries. Very often the agreements will take the form merely of contracts for joint development of natural gas, natural-gas byproducts, and refinery gas. In many cases, however, the interlock will be more intimate and more definite. The development will have great advantage in the long run both for the public and for those utility corporations which wisely enter into contracts which have real mutual benefit to gas and petroleum. Of course the question will always be—How can this mutual interest be best arrived at?

(Next month Mr. McBride proposes to discuss some of the gas merchandising problems of the industry from the standpoint of energy competition. Editor.)



What The Manufacturers Expect From The Gas Companies

DAVID F. KAHN

President, Estate Stove Company and Chairman, Manufacturers' Section, A.G.A.

I HOPE you will regard the Manufacturers' Section in its proper light—not as an organization merely to protect the interests of manufacturers but as one for the mutual good of the manufacturers and the utilities. As a matter of fact, utility executives and officials of the A.G.A. were themselves among the first to recognize changing conditions in the industry which necessitated closer co-ordination with the manufacturer members.

Looking back over the past few decades, it is interesting to trace the evolution of the merchandising of gas appliances. Very early in the history of the gas industry, it became apparent that the hardware store and other stove dealers could not be relied upon aggressively to push the sale of gas appliances. And this was a perfectly natural condition, because the introduction of a new type of gas appliance had always been a pioneering job, requiring a lot of expensive educational work. So the gas company itself assumed the important job of selling gas-consuming appliances, and the new business and commercial departments came into being.

Extreme Measures

In attaining the first objective—greater gas consumption—gas companies have in the past gone to extreme lengths. Ranges in large numbers have been given away, sold below cost or rented for a nominal sum. These practices were rather general in the days now happily past when consumer resistance to cooking with gas still persisted. As the saturation point of gas cookery was approached, however, and an increasingly large number of new gas ranges simply replaced old ones, most of the companies came to the realization that there was no longer any reason why their appliance departments should not be placed on a self-supporting basis.

But much damage to the appliance industry had already been done. Giving away appliances, selling them below cost and renting them naturally tended to cheapen the manufacturers' products in the eyes of the consumers, and gas appliances thus got off to a bad start, from which they have never fully recovered. Instead of starting life as a specialty, with a price set-up that would enable wholesalers and retailers to use specialty selling methods, as has been done with almost every other successful household appliance, most of the products in our field have started right out as closely-clipped staples. Hammering upon manufacturers for lower and even lower prices—a trade custom which was well founded long before the days of the current business depression, and which persists in a virulent form today—has had the unwholesome effect of depriving manufacturers of a profit margin which would enable them to carry on more intensive engineering and market research work and to advertise in an impressive way to the consuming public. Except in the wealthiest homes, every purchase of a major household appliance is a compromise. The decision to purchase a washing machine usually means that the purchase of other badly-needed appliances—a gas range perhaps among them—be deferred. In these decisions, the appliances whose time-saving, labor-saving features are most widely advertised are, naturally, the ones which get the advantage.

Considering their importance in the household, gas appliances have had a pathetically small amount of advertising. In 1931 only two makes of ranges were advertised nationally on anything like a comprehensive scale. Is it any wonder then that the public is seemingly more interested in the acquisition of radios and other luxuries and semi-luxuries than in such seemingly prosaic things as gas appliances?

"A Poor Honest Working Girl"

In competitive industries, notably in the electrical field, not only advertising but a vast amount of free publicity in magazines and newspapers has invested the products with a glamor which has never been associated with gas-burning appliances. In the public mind the gas appliance has been merely a poor but honest working girl, while the electrical appliance has been enthroned as a movie queen.

No doubt the attitude of the people in the gas industry is partly to blame for the growth of this mis-

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conception. We have been handicapped, perhaps, by the age of our industry; we have become blase, and have taken the wonders of gas too much for granted. A rekindling of our own enthusiasm is needed today, and if we simply set off the spark I think we shall be pleasantly surprised in seeing how quickly the fire will spread not only through our own industry but throughout the whole field of our customers and prospects.

However, in today's situation, in spite of the tremendous sales appeal in modern ranges, in automatic gas heating plants and other modern gas-consuming appliances, greater emphasis is placed on price than ever before, and a number of the most reputable manufacturers are obliged to sell certain items Below Cost in order to hold their accounts. This is a bad predicament, not only for the manufacturers, but for the entire gas industry as well. If the industry is to go ahead, all branches of the industry must prosper.

After all, why should a utility company, in the selling of appliances, place major emphasis upon price? By what line of reasoning is such a policy ever followed? Let us go back for a moment to the three purposes of appliance sales by utility companies.

The first purpose, to increase gas consumption, obviously, is a factor of prime importance only when a gas appliance is installed to do the work which was formerly done by some other fuel. But, today, almost universal acceptance for such appliances as gas ranges and gas water heaters—and, to some extent, space heaters—has been won, and a very high percentage of all such appliances sold simply replace older gas appliances. In all such replacements there is little likelihood of an important increase in the gas bill. Of course, the new convenience features and the facility for doing a better job will inspire a greater use of such appliances. On the other hand, these improved appliances reduce the amount of gas necessary to do various jobs. So the net result is only a small gain for the gas load.

Which Is More Important?

There is little justification for a gas company to place primary importance on the third purpose, namely, to make a profit on the merchandise—because, clearly, the sale of gas is more important. So don't we come naturally and logically to the conclusion that the all-important reason for gas companies to sell gas appliances today is purpose number two, to insure consumer satisfaction with the fuel?

Among all of a public utility's assets, there is nothing so good as good will. This has always been true, but today it deserves more careful consideration than ever in the past because of the competition of other fuels with which the gas industry is now faced. The cooking load, which once seemed so securely held by the gas industry, is to be actively contested for beginning this year with a multi-million dollar co-operative advertising and sales promotion campaign in favor of the electric range. The gas water heater, too, is faced with electric competition, and oil burners are making headway in the field of cooking as well as in heating. What other method could be nearly so effective in meeting this new competition than equipping your consumers with gas-burning appliances so well built, so modern in appearance, so economical in operation and so *completely equipped* with time and labor-saving devices that appliances for other fuels will offer no temptation? That is what I have been leading up to. That is what I am pleading for—a recognition on your part that price is *not* of paramount importance in merchandising appliances; no, not even in today's market.

The very life of the industry, in my opinion, depends upon selling better, more modern appliances. Regardless of what character of appliances is sold by furniture houses and other dealers in your community, it behooves you to set a high standard by centering your efforts upon the sale of high-grade, completely-equipped appliances.

A Bold Stand Will Help

You recognize the value of oven heat regulators in saving time and assuring better baked foods. *Then why show any ranges which are not so equipped?* Don't you see that such a bold stand on your part will quickly help to raise the standard of gas ranges for all of the retailers in town?

This naturally brings me to a subject which has had much consideration by gas men during the past few years—that of dealer co-operation. I know that various plans of dealer co-operation have been tried, and that the perfect plan has perhaps not yet been evolved. But it seems to me that it is no longer a question of whether the gas company chooses to ally itself with the dealers—that dealer cultivation (broader in its scope than the usual form of dealer co-operation) is essential to the preservation of the market for gas and gas appliances. The gas company should never lose sight of the fact that every unworthy gas appliance which is sold by a dealer will react unfavorably not merely upon the dealer, but also upon the gas company. Furthermore, so long as the gas company and the dealers are actively competing with each other, mud slinging is almost sure to develop, the gas company's representatives assuring prospective purchasers that the appliances sold by the dealers are unreliable, while the dealers' salespeople point out that since the gas company is in business to sell gas, the appliances which it offers are designed to consume an excessive amount. And the net result is bound to be a breaking down of public confidence in all gas and all gas appliances.

After all, if you will accept my premise that insuring consumer satisfaction with the fuel is the all-important objective of any gas company's merchandising activities, especially in the gas range field, why shouldn't you make it possible for the dealer to get a large enough volume of appliance business at a good profit to keep him really interested and enthusiastic about the sale of gas appliances? In the refrigeration field, which we must recognize for its outstanding achievements of the past few years, dealers are being brought more and more into the picture, and I believe that this sort of a set-up is just as necessary in the gas appliance field.

Then, I believe that the gas companies should go further. I think they should undertake education of the dealers' salespeople so that they may be equipped to go out and sell gas appliances just as intelligently and with just as much enthusiasm as the gas companies' own representatives. I believe that in all of the newspaper advertising on gas appliances which is done by gas companies, the names of the co-operating dealers should be included.

Above all, I urge *honesty* and *sincerity* in dealer relations. With the best intent on the part of gas company heads, many attempts at dealer co-operation have failed miserably simply because the outside salespeople of the gas companies, dependent upon commissions for a living, have gone out and knocked the dealers. I realize that this is a difficult situation to control effectively. One company with whose operations I am familiar has adjusted commissions so that each of its outside salespeople receives the same percentage of commission

on sales made through dealers in his district as on sales made by himself direct to the consumer. Thus, each dealer's store becomes a display room for the gas company representative and complete harmony of sales effort is assured. In some cases, perhaps the only way out is to pay outside salespeople a straight salary instead of a commission. If that's what it takes to bring about real co-operation, that is the course which, in my opinion, should be pursued. Extreme measures are warranted because the net results of a program of honest and sincere dealer co-operation are bound to be the raising of the standard and a great increase in the volume of appliance sales, insuring greater consumer satisfaction with the fuel and some additional consumption.

Customer Must Be Enthusiastic

Certainly it is folly for a gas company to sell any appliance which cannot be depended upon to make the user not merely satisfied, but enthusiastic. The tendency to push low-priced appliances in order to secure large-volume appliance sales has come about evidently through losing sight of the primary objective of appliance selling. Appliance sales by gas companies, as I have previously pointed out, are not in themselves an *end*, but merely a *means to an end.*

To my plea that gas companies prepare for the competition of other fuels by selling better, more completely-equipped appliances, I would add the recognition on your part of the necessity of a profit for the manufacturer which will enable him to carry on intensive research work in marketing, as well as in engineering, and to apply the power of national advertising in making your consumers conscious of the time and labor-saving features in modern gas appliances.

I wish that it were possible for the American Gas Association to go ahead with the proposed co-operative national advertising campaign. It is particularly important in the gas industry, because we have in the gas appliance business no such giants as General Electric and Westinghouse in the electric field to fly the flag for the benefit of the entire industry. In the meanwhile, there is much that the individual gas companies could do to protect and develop their markets.

In many quarters, there seems to be a feeling that the resale of appliances is primarily the manufacturer's job. There are noteworthy exceptions, of course, of companies with efficient, highly successful commercial departments, but in many companies there seems to be a lamentable lack of merchandising ability. The policy simply seems to be to furnish facilities for manufacturers to come in and do their own reselling to the consumer through the utility. Many a contract for appliances apparently is placed not so much upon the basis of the merit of the appliances and their public acceptance, as on the basis of the most appealing sales plan with plenty of free services and free advertising materials thrown in. Of course, I do not mean to suggest that gas companies should not be receptive to merchandising ideas from manufacturers, but I do believe that every company should have the disposition and the ability to plan and carry through its own merchandising activities. (While I am on this subject I wish to pause to pay tribute to the excellent work which your own New England Gas Association has done in giving publicity to gas and modern gas appliances, also to the wonderful work of the Pacific Coast Association.)

In the gas range end of the business I have noted too great a tendency on the part of gas companies to concentrate all of their energy and advertising appropriation upon one or two limited sale periods during the year. I believe you should keep in mind the fact that your consumers are being importuned to buy other appliances outside of the gas field during every month of the year, and on that account the sales promotion of gas ranges, as well as other gas appliances which have a year-'round use, should be a year-'round proposition.

I believe that those manufacturers who are making a real effort to help gas companies sell more and better appliances to their consumers through the medium of national advertising are entitled to support. If the present demand for lower prices continues, it seems quite obvious that manufacturers will have to withdraw all advertising support, which would be especially serious at a time when the advertising of appliances for competitive fuels is assuming impressive proportions. In this connection, just consider what the splendid national advertising of Electrolux has done to sell the idea of gas refrigeration for the benefit of the entire industry. All national advertising of a modern gas appliance not only helps to get consumer acceptance for that appliance, but actually helps to sell the idea of "Gas as the Modern Fuel."

Gas Salesmen Education

In discussing dealer cooperation, I have already touched upon educational work. Too much stress, I think, cannot be laid upon its importance. The gas range salesman should not merely be familiar with the construction and operation of gas appliances, but he should know how to cook, just as the sewing-machine salesman knows how to sew, just as the washing-machine salesman knows how to wash. He should be familiar with all the uses of the appliance so that he may be prepared to point out ways to use more gas to the benefit of the user and the company. Furthermore, he should be fully posted on the features of appliances using other fuels so that he may be prepared to talk intelligently when competitive situations arise. I realize that all this entails a lot of work on the part of some one in every gas company, but it is work which is necessary. And may I say again that all of the salespeople of co-operating dealers should receive the same education which is given to the gas company's own representatives.

One more thing in this list of what the manufacturer expects. Wonderful work is being done by some of the companies in window and store display. The work of such men as Martin, of Consolidated of New York, Bratesman, of Boston Consolidated, and Alexander, of Public Service of New Jersey, has set a new high standard in the industry, but the general average is still not up to the displays of the electrical industry. Even the rarest gem does not show off to advantage until it is placed in an appropriate setting. Modern gas appliances need to be and deserve to be shown in modern show rooms and windows.

I have been speaking very frankly, which I think is what you wanted me to do. Perhaps I can best sum up these remarks by urging a greater attempt on the part of all of us to understand our mutual problems. This is a critical period in the gas industry. Certainly at such a time, it behooves us all to forget petty desires and to work for the common good of the industry.

The Safe Utilization of Natural Gas

By A. A. KLINGE

Manager Safety & Claims, Public Service Co. of Colorado

IF I were to select two factors which have done most to promote the safe utilization of gas, they would be:

(1) The careful selection of employees able to understand and operate new devices, and capable of passing on their knowledge to the consumers.

(2) The effective training of these employees and, through them, of the consumers.

The problem is as simple as that. There are special hazards to be encountered in the use of natural gas. There is constant change and improvement in the design of gas using equipment; new conditions must be met in transmission and distribution. But given a trained, efficient personnel these problems can be met steadily, economically, and safely.

The matter of selection in our own company has not proved specially difficult. Obviously unfit individuals are weeded out at the first interview, and a system of close and constant supervision, plus a readiness to eliminate promptly any individual unable or unwilling to adapt himself to our practices, has done the rest. The important factor has been the knowledge on the part of those hiring or supervising employees of the qualifications necessary for the job. In other words, each supervisor has constantly in mind a set of specifications covering the kind of man needed in his work.

The training program has been rather more elaborate, ranging from conference meetings and shop experiments to "dummy" calls designed to test an employee's ability to impart the necessary information to the consumer. Fortunately, we were able to install natural gas in several smaller towns before attempting to change over a metropolitan area to natural gas, thus having opportunity to select competent and reliable supervisors.

The Big Six in Gas Safety

Turning to the physical conditions necessary to the safe utilization of natural gas, there are six essential factors:

(1) The supply must be continuous and reliable, both as to quantity and quality.
(2) The pressure must be adequate and uniform.
(3) Leakage must be kept at a minimum.
(4) Appliances and their accessories must be capable of proper adjustment so that correct combustion may be obtained.
(5) These appliances must be correctly installed.
(6) Both employees and customers must understand the correct use of these appliances.

Read before the 20th Annual Safety Congress & Exposition, Chicago, Oct., 1931.

These six cardinal points cover a multitude of activities, some of which must perhaps be observed in all cases, others being dependent on local conditions. There can be no hard and fast rules, equally suitable in every city, town or village. However, a knowledge of what has been and is now being done elsewhere is unquestionably an aid toward correct solution, and it is for this reason that I offer some experiences of the Public Service Company of Colorado.

Practical application of these basic rules begins long before the natural gas reaches its destination at the appliance. Every effort must be made to insure continuity of supply and uniform quality. A sufficient gas reserve must be developed, enough wells must be drilled to supply the load. Adequate compressor station equipment must be provided. On the Denver-Amarillo line, a telephone system extends from Denver to the field, and hourly reports of pressures, wells in use, and similar operating data are supplied to a central dispatching point. The United States Weather Bureaus at important load centers along the line are consulted three times a day and a prediction of storm or cold weather calls additional equipment into service so that increasing demands can be met.

The line itself is designed to insure a continuous supply of gas. For instance, extra compressors are standing by to maintain pressure if others fail. When the line crosses rivers, as many as seven individual parallels are used, so arranged that any one may supply an uninterrupted and ample flow of gas. Men on foot patrol the line, watching not only for existing trouble, but for conditions which later might impair service. At the town border station where the natural gas enters the city distribution system, every precaution is taken to prevent the pressure regulating devices from failure.

It is true that many of these precautions are taken in the interests of continuity of service, but they are nevertheless safety essentials. When service stops, even for a second, pilot lights are extinguished, thermostatic devices open main valves, and the stage is set for tragedy.

Leakage—The Great Distribution Problem

Inside the city limits, the local company carries on equally intensive work. While the practical application of this work is toward the same end, the methods are somewhat more complex than those used in operating the transmission line. The explosion hazard in particular is of much greater importance in a thickly populated community than along the barren stretches traversed by the pipe line.

Much research has been carried on with the object of reducing distribution leakage. Always a matter of major importance to the gas fraternity, it becomes infinite-

ly more so in instances where natural gas is introduced into a distribution system formerly supplying manufactured gas. The absence of moisture in the natural gas makes it "vapor hungry," and in satisfying this hunger moisture and oil are drawn from the joint packings of cast-iron mains, from meter washers and union gaskets. A shrinkage results and the volume of leakage mounts at a tremendous rate. Pits and cracks in the pipe, once sealed by the impurities present in manufactured gas, are opened, further increasing the leakage.

Fortunately, these possibilities of increased leakage were foreseen long before natural gas was brought to Denver in 1928. It was decided that the simplest solution was to saturate the natural gas with water vapor and oil to duplicate as nearly as possible the relative humidity which prevailed in manufactured gas. Provision was made to install saturating equipment at the major points of delivery to the low pressure distribution network, and this equipment was placed in operation at the time natural gas was introduced. The effect of this procedure on main leakage has been remarkable. No leakage increase has occurred despite a tremendous increase in load. In other situations where saturation was not employed, leakages have increased as much as ten times that normally prevailing with manufactured gas.

Leather meter washers and union gaskets were supplanted by composition rubber gaskets which do not shrink. In Denver, this change in material was started more than a year before natural gas was introduced, and during the past three years an inspection program plus response to leak complaints has eliminated almost all of the leather gaskets and washers.

Despite every effort, all leaks cannot be eliminated. We had every reason to believe that there was no radical change in our procedure or equipment during the year 1928, when natural gas came to Denver—yet immediately following the change, leak complaints decreased by half. The cause was obvious—the almost complete absence of odor in the natural gas. The equally obvious remedy was to supply an odor—of equal intensity and as similar to that of the manufactured gas as possible.

Several materials were used in early trials but all had one or more drawbacks. Some were erratic; some produced odors in no way resembling that of manufactured gas; some were too high in price. Finally a liquid was found which had the proper odor, was reasonable in price, and could easily be introduced into the gas stream. The necessary equipment was constructed and placed in service, and an immediate increase in leak complaints was traced to minor leaks indistinguishable with the nearly odorless natural gas but immediately apparent when the odor intensity returned to the old level. These being corrected, the leak complaints returned to the falling curve existing before the introduction of natural gas.

Electrolysis Survey

In addition to these two programs, the gas distribution department inaugurated a number of less extensive activities in the interests of safety. Considerable time and thought was given to electrolysis surveys, and a joint committee of gas, telephone and street railway men worked on this problem. This appears to be the only possible way of attacking this problem, the street railway men cooperating to secure the rail-bonding necessary to reduce electrolytic action, and the telephone company entering the picture because of underground conduits and manholes which may become filled with leakage gas. Study of this feature of the problem will immediately show that while the gas company has an obligation to hunt out and repair leaks, the telephone company and others having underground conduits or manholes also have a distinct obligation to carry on such tests of the air in their manholes as will serve to prevent asphyxiation or explosions.

Fortunately, adequate means of testing are available and if reasonable precautions are taken the danger from this source can be overcome. Several combustible gas detectors were purchased, and a periodic inspection procedure established where valve boxes, pits, and similar locations were tested for leakage. In parts of town where main leakage was suspected, a bar was driven into the street, opening a free path from the main to the surface, and the leak detectors were again employed. Gas service files were gone over and all old services listed, to be inspected and renewed if in bad condition.

Protection of Drug Store Services

Soil surveys were made to determine the relative degree of corrosive action in various parts of the city, and very close attention was given to mains and services in the bad areas. All gas services entering drug stores were inspected and it was found that the practice of dumping brine from ice cream can at the curb had caused much service pipe corrosion. As a remedy, all gas services now installed at such locations are protected by a casing of scrap pipe extending through the corrosive area. Use of coated or wrapped pipe has been adopted at an ever increasing rate.

Parallel to this program of hunting out and correcting conditions which may cause leakage, is the second main safety activity of the distribution department—that of maintaining adequate and uniform pressure. This necessitates frequent and extensive load and pressure surveys and a system of dispatching. As an example of the care taken in this regard, I might mention that whenever any district, however small, is shut off from gas service, every customer in that district is visited and every gas-burning appliance is tested before the return to service is considered complete.

Under the organization used in the Public Service Company of Colorado, the work of the gas distribution department ends at the wall of the consumer's premises, and from this point on all work is handled by the utilization department. This work includes such items as the installation of meters and regulators, connecting gas appliances sold by the company, and servicing all gas equipment in the customers' homes irrespective of make or agent. Since the fitters and trouble men of this group have closer contact with the consumer than any other group, it is only logical to expect to find there a decided emphasis on the educational feature of safe utilization. If the distribution workman requires a Doctor's degree in safe practice, the utilization man needs a Masters'—plus exceptional ability as a teacher.

One of the most important phases is that of residence heating. Since Denver is not an industrial center in the accepted sense, there were few opportunities for load building along these lines. It early became apparent, then, that the financial success of Denver's gas business hinged upon the possibilities of load building through residence heating. An intensive campaign was started in 1928 and is still in operation, a campaign which has increased the load from one gas-heated house in 125 in 1928 to one in five at the present time (1931).

Not least among the items contributing to such a growth was the development of residence-heating equipment which would provide safety. All the sales arguments which can be gathered together will have little effect if the service rendered is not safe as well as

convenient. This was fully appreciated at the start of our residential heating program and the efforts to provide safety have never been relaxed. It has been extended to take in requirements at first unpopular with the customer but welcomed once they are understood. Among such items are requirements for chimney linings which protect brickwork from condensate, standards for piping which are slightly more expensive but once adopted insure highly reliable service, and flat refusals to connect improper or inadequate equipment.

Customer Education

Hand in hand with the program of safe equipment, there has been carried on a system of customer education. The real test in this case was not whether the equipment could be operated safely but whether the customer using it could operate it safely. Many old ideas and practices had to be eliminated. For instance, it is common practice to turn on the top burner of a range, reach for a match and then finally ignite the gas. A house-heating burner, operating within the confining walls of a furnace or boiler, using gas in vastly greater quantity, cannot be operated in such a nonchalant manner. A definite procedure must be followed or disaster may result.

Tracing through the steps involved in the installation of residential heating, we find the safety idea predominant in nearly every one. When the salesman completes the sale and the installation reaches the fitting shop, a measure man visits the customer's home, carefully inspects the furnace to see that no cracks or holes exist which might allow products of combustion to foul the circulating air, investigates the flue to see that it is adequate. Often the cemented joints in the furnace coating are not tight, and the furnace must be re-cemented before gas burning equipment can be installed. By the time the measure man leaves, the customer is usually in possession of expert knowledge as to the actual condition of his heating plant as it stands.

After the measure man has completed his inspection and made his report, the actual installation begins. The heat-absorbing surfaces of the boiler are scrubbed with a wire brush and washed down with a hose, a procedure which not only improves the efficiency of operation but sometimes uncovers defects previously overlooked. The smoke pipe is taken down and cleaned. The chimney flue is inspected by means of mirrors and lights, and loose scale, soot, etc. removed from its walls. Where no soot pocket is provided at the base of the flue, one is made and a chimney cleanout installed so that mortar, leaves, etc. which may accumulate in the chimney can be removed. The importance of the chimney clean-out as a safety factor cannot be overestimated; there are people alive today who owe their lives to this simple precaution.

When the installation is complete and adjustments made, the damper is wired in the correct position and a small tag attached advising the customer that no change should be made. An instruction sheet is fastened to the basement wall close to the furnace and in a conspicuous position. This card explains in simple language the proper method of lighting the furnace. Every effort is made to prevent any misunderstanding. The three valves which control the burner equipment—pilot, main burner shut-off, and thermostat-controlled valve—are tagged with brass numbers corresponding with those given on the instruction card. A lighter tube is included in the installation to further eliminate hazard in lighting the pilot. An enameled sign is placed on the fire door, warning the customer that the main burner must be turned off before pilot light is lighted. The instruction card further advises the customer to inspect the pilot daily and the chimney clean-out weekly. Instructions relating to the chimney clean-out are repeated on a linen tag attached to the clean-out handle.

Follow-up Instruction

Shortly after the installation is completed, an inspector visits the job and checks the installation and adjustments. He then learns which member or members of the household will operate the plant. If the man of the family assumes this responsibility, the inspector frequently makes another call in the evening.

The instruction given may be divided into three steps. First, there is a general explanation of how the system works, the inspector explaining how the valves are numbered for identification and the reasons for a set routine in operating. Next, the actual starting procedure is carried out by the inspector as often as necessary until the customer has learned the proper sequence. The third step is that of having the customer run through the sequence until he is fully familiar with it and confident of his ability.

When the inspector is convinced that the customer can turn on and off the equipment and understands the necessary precautions for pilot and clean-out, he secures the customer's signature on a form acknowledging the instruction and accepting certain responsibilities in regard to pilot and chimney. Then, two or three days later, the customer is called by telephone and questioned to see if further instruction is desired and the installation satisfactory.

Finally, perhaps ten days later, a form letter is sent out welcoming the new customer into the ranks of satisfied gas users. The name of the person who has received instruction is quoted in this letter, with the request that if further instruction is desired or some other person is to operate the equipment, the company be called at once. The rules for safe operation are again referred to in this letter.

While this procedure may seem unnecessarily complicated and expensive, it has paid handsome dividends. The customer becomes self reliant—sometimes a trifle boastful—and this not only makes for a more finished, reliable operation of the equipment but is a distinct sales asset. It is also a vital factor in reducing the expense of future free service, since less assistance is needed and since the customer is apt to detect minor trouble and have it corrected before it becomes serious. In September, 1930, only one customer in five asked for turn-on assistance as compared to almost 100 per cent requests four years before. I can hardly emphasize this educational feature too strongly. Safety is a matter of men rather than material, and the customer's thorough understanding of his equipment is a safety essential.

Workmen Educated First

Since the education of our customers must be given primarily by our workmen, it was necessary to start the program with them. It was essential that a common understanding of the various problems exist among these men and that a common method of instructing the customer be used. This was accomplished largely by conferences with groups of eight or less. During these meetings each type and class of appliance was studied, a diagnosing technique developed, and a routine of customer instruction agreed upon and adopted. These conferences were supplemented with practice on test cases and by a "sampling" with "dummy" calls.

Serious as is a leak in the main or service outside the house, it becomes even more important if gas escapes into a closed space. An extensive leak survey was carried on by the utilization department in conjunction with that already mentioned for the distribution department. Every building in the business district was visited, the basement carefully tested with combustible gas detectors, and special attention paid to basement walls adjacent to the main and service pipe. Show window bulkheads, small rooms and closets and other places where gas might collect were investigated. At the same time all long-screw fittings were replaced by dresser-type couplings.

Where the service pipe entering a building appeared to be in questionable condition, the distribution department was called in for assistance. All service entrances were inspected and if not properly and tightly sealed into the wall were made gas tight. There were, of course many minor corrections such as relocating meters or removing unused house piping.

Following the inspection of the business district, all community centers in the residential districts were visited. After the city was finally covered, a routine schedule was developed so that inspections could be assured at reasonable intervals. For example, public buildings such as lodge halls, picture houses, stores, telephone exchanges and other buildings where large numbers of people congregate, are now inspected at least once a month. These inspections are very thorough, and while usually barren of direct result the potential stakes are so large that we consider the slight cost of this safety precaution well warranted.

Comparatively stringent rules have been drawn up to cover gas appliance installation. The use of gas appliances in bath or toilet rooms is prohibited. Flexible tubing may not be used except as pilot or lighter tubes or to supply mobile appliances. Hot plates and space heaters are definitely excluded from classification as "mobile."

Cooperation with City Departments

Close cooperation is maintained with the City Inspection Department and the Fire Prevention Bureau of the Denver Fire Departmnt. Before any new company rules are introduced or old ones amended, they are discussed with these groups so that the resultant practice is mutually satisfactory. These civic agencies are of great value in helping to satisfy consumers that safety precautions are really necessary and not merely a whim of the company or a device to secure additional revenue. We have always found the city authorities more than anxious to protect the lives and property of the citizens and always willing to keep abreast of any new discovery or development.

One factor which is always present is that of the unscrupulous or at best irresponsible dealer or workman who sells or installs improper, often unsafe appliances which the company is later expected to service. Our cooperation with city authorities is very useful in mitigating the consequences of such installations. Where any such appliance is found and our men consider the conditions dangerous, the city inspector is notified and almost always directs the company to discontinue service until the hazard is corrected. Generally speaking, the city inspectors have required other agencies to install appliances of a quality and in a manner comparable to the standards set up for our company.

All gas appliances sold by the company are subject to test by the utilization department test laboratory. Every new type of gas appliance is carefully scrutinized to see that it is satisfactory from an operating viewpoint. Various tests are made to determine the relative safety of operation, and in some cases appliances are rejected because of pilots hard to light or some similar feature which might make operation difficult for the customer. Insofar as possible, only those appliances carrying the blue star of the American Gas Association are recommended. Even some of these are not suited to our needs, since the high altitude of Denver has a material effect on capacities and we frequently find that safe operation can not be obtained with sea-level rating.

Very detailed attention has been given to the matter of instructing employes in first-aid. A definite plan of instruction has been developed whereby every man in the gas department has been trained in first-aid work, carries a card to show that he has proven himself a safe man to work with, and is regularly re-examined to maintain his standing. Our company has been fortunate in obtaining the assistance of the U. S. Bureau of Mines in carrying on this training. Credit was given on the company plan to those employes who successfully completed the Bureau of Mines training course, and a large proportion of our men now hold the Bureau of Mines certificate in addition to that awarded by the company.

Perhaps it may seem a rather far step from the subject of this paper to discuss first-aid training. Actually, we find that the study of first-aid is closely allied to that of accident prevention, and it is a short step from the employe protecting himself from accident to his assumption of responsibility for preventing accidents to fellow workmen and the public generally. It is noteworthy that the frequency of public injury and damage claims appears to vary directly with the employe accidents in the department concerned.

A Set of Specifications

With these facts in mind, perhaps we can draw up a set of specifications for the safe utilization of natural gas. The first of these must be a willingness to face facts. Under certain conditions natural gas is a high explosive and must be treated as such. Carbon monoxide is almost always present in the products of combustion, and asphyxiation may result unless adequate vents are installed and maintained. Condensate does form from flue gases and will damage brick work and mortar, possibly causing flue stoppages unless precautions are taken. These facts cannot be met by closing the eyes and hoping for the best. They can be met by proper installation, operation and maintenance. We are working with powerful forces, dangerous when uncontrolled but safe and useful so long as they are controlled.

The second specification must be a policy of frankness toward the customer from the time of first contact with our salesman. It is his right to understand the hazards to which he and his family will be exposed and the routine he must follow to operate his plant or his appliances safely. This does not mean frightening the customer, and need not make him hesitate to use gas service. The known hazards of motoring are far greater—without keeping people off the highway.

And since the principal point of contact is through the company's employes, our third specification must be the careful selection and thorough training of these employes. In selecting them, I would look for thoroughness, active curiosity, and the man's ability to convey his thoughts accurately in every-day language; these in addition to the usual neatness, health, and unfailing courtesy. In training, I consider the conference method

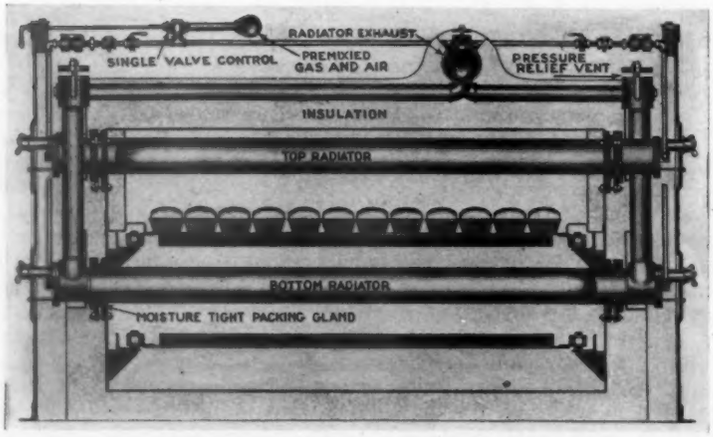
(Continued on page 52)

Industrial Furnaces For Gas

XIII-Food Baking Ovens

LAWRENCE E. BIEMILLER

Supervisor Fuel Sales, Consolidated Gas, Electric Light & Power Company



Radiator used in Crawford Kemp Oven, showing relationship of Bread on Hearth to Radiators in which Gas-Air Mixture is burnt

ONE of the largest and most important industries in the United States is the food baking industry. This article will consider ovens for baking other foods, in addition to those best known, namely, bread, cakes, cookies, crackers, pretzels and pies. The wholesale value of these latter bakery products exceeded one and a half billion dollars in this country alone in 1929. This can be compared with the following list of manufacturing industries for the same year:

Industry	Value of Product	Wage Earners
Bread and Bakery Products	$1,510,000,000	198,000
Steam Railroad Repair Shops	1,180,000,000	368,000
Cigars and Cigarettes	1,068,000,000	105,000
Women's Clothing	1,678,000,000	183,000
Cotton Goods	1,503,000,000	428,000
Electrical Machinery	2,274,000,000	329,000
Foundry and Machine Shop	2,751,000,000	458,000
Iron and Steel	4,130,000,000	419,000
Lumber	1,276,000,000	411,000
Meat Packing	3,395,000,000	121,000
Motor Vehicles	5,262,000,000	448,000
Petroleum Refining	2,612,000,000	77,000
Printing and Publishing	2,734,000,000	285,000

The chief bakery products are classified as follows, with regard to their value, during that year:

Product	Million Pounds	Value
Bread, rolls, etc.	9812	$756,000,000
Crackers, cookies, pretzels, etc.	1328	268,000,000
Soft cake	....	231,000,000
Doughtnuts, crullers	....	39,000,000
Pies	....	73,000,000

There were approximately 20,500 of such establishments, this number having increased 13 per cent during the preceding two years.

Some idea of the importance of this industry as a consumer and potential consumer of industrial gas can readily be obtained. The average large bakery uses from 1 to 1½ cubic feet of manufactured gas per pound of bread produced. At even the very efficient lower figures, the yearly gas consumption, if all bread were baked with gas, would be 9,812,000,000 cubic feet, which exceeds the annual gas sales in the average city of 700,000 population. This business is of added importance to the gas industry because of the nature of its load factor. The gas consumption is nearly constant throughout the year, and most of it is between the hours of 7:00 P.M. and 6:00 A.M., when the use of gas for other purposes is near its minimum.

The Baking Process

The baking process is essentially the same for bread, and for most other products. For bread—flour, water, milk, sugar, malt, lard and yeast are all dumped into a dough mixer for a very intimate mixing. The resulting dough is dumped into a trough and permitted to stand for from 3 to 10 hours for fermentation of the yeast, with the escape of carbon dioxide, which results in a light bread. It is then shaped like a loaf and put into pans. In the oven the dough rapidly swells from the expansion due to heat of the gases within the loaf. The outside becomes changed into a crust; part of the water in the dough, most of the carbon dioxide, and some of the alcohols produced by fermentation, escape. Meanwhile the sacs or cells of gluten and starch inside gradually expand, causing the vesiculated appearance of the crumb of the loaf. After a time the gluten and certain other nitrogenous compounds are coagulated; the moistened starch of the dough is then gelatinized and becomes fit for food purposes. The yeast and bacteria are killed by the moist heat and thus the bread is sterilized.

There is a wide difference in the temperatures at which different products are baked, as is shown by the following tabulation:

Product	Baking Temperature ° F.
Macaroons	175–200
Wafers	175–200
Layer and Cup Cakes	300–350
Cookies	375–425
Pastries, eclairs	350–400
Small Cakes	400–450
Bread	400–450
Pretzels	450–500
Pies	475–550
Ice Cream Cone	500-520

There are many different types of ovens used for baking these products. They differ not so much due to the product to be baked, as to the number of units of a product to be baked. For the small bakery there will be one oven which is used to bake many different kinds

of products. On the other hand, a large baker may have one type of oven to produce a large quantity of bread, and different ovens for much smaller quantities of cakes, and entirely another kind of oven for pies. Since gas is clean, and it is simple to obtain an even distribution of heat, and to maintain any desired temperature with gas, it is extensively used in all types of food baking ovens.

Cabinet Oven

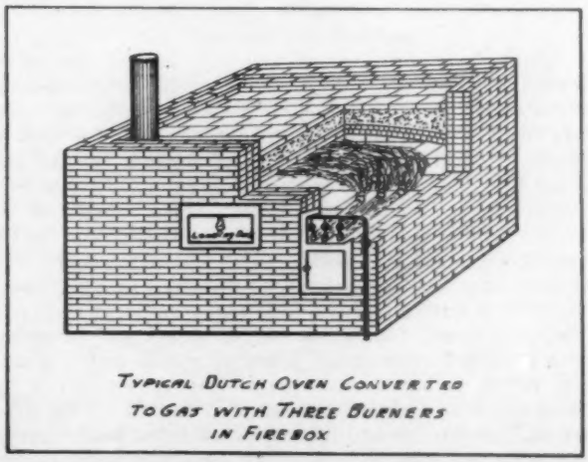
The cabinet oven is a portable oven well adapted to the baking in a small bakery. The usual type consists of 3 or 4 shelves, heated by 3 or 4 bars burners on atmospheric gas, located beneath the bottom shelf. The products of combustion travel up each side of the oven, and enter each shelf through openings graduated to result in even heat distribution. The oven is vented from the top.

Air cell asbestos is packed around the entire oven, usually to a depth of 2 to 4 inches. The shelves, ⅜ inch thick, are often of transite, which gives good heat distribution, and uniform bottom baking. The combination of the transite shelf, the graduated openings to each shelf, and the thick insulation, results in a very even bake, which makes possible baking on all shelves simultaneously, with equal results. Such ovens can be obtained either with indicating thermometers, or automatic temperature control. An oven 66½ inches high, 52½ inches wide and 40 inches deep outside, has 4 shelves each 41⅓ by 31½, and a baking capacity of 72 one and one-half pound loaves, or 48 ten inch pies. Such an oven has about 60,000 B.t.u. per hour burner capacity.

This same type of oven is obtainable in a new design which has individual burners under each of two shelves and individual thermostats controlling each of these sets of burners. This makes possible the baking of different products at different temperatures on the different shelves at the same time. Ovens of both these types can be readily moved if the baker changes his location. They are adaptable to use in 2 or 3 units, as a baker grows, but before he is ready for a larger oven of another type.

Stationary Flat Hearth Ovens

There are many heavy brick ovens now in use, largely on solid fuels. The one most frequently encountered is the Dutch oven, a sketch of which is here

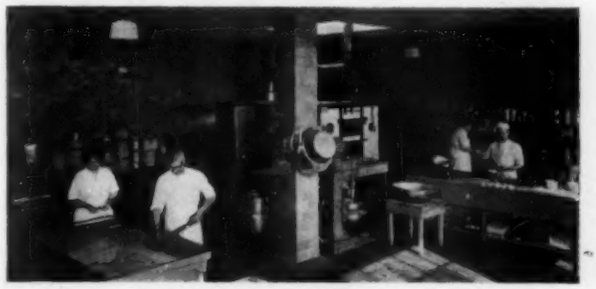


TYPICAL DUTCH OVEN CONVERTED TO GAS WITH THREE BURNERS IN FIREBOX

shown. It is a direct fired oven, however; the firing is not done while the product is being baked. The firing is done intermittently, during which period heat is being stored in the heavy oven walls, hearth, and crown. Then baking is done until the temperature of the oven falls, when it is again reheated. The following is a typical schedule of an oven with hearth 12½ by 10 feet, which has been converted to gas:

Heating Up—1½ hours; 550,000 B.t.u. supplied.
Soaking Period—1½ hours; no fuel used; flue shut.
Baking Period—4 to 6 hours; 550 pounds bread, buns, rolls and cookies baked.
Flash Heat—20 minutes; 125,000 B.t.u. supplied.
Baking Period—450 pounds of bread baked.

If a heavy product like bread is baked, there may be a short separate firing period after each batch, but if a light product is baked, or different products are baked in order of decreasing heat requirements, there will be a long baking period without any heat being supplied. It is difficult to convert such Dutch ovens except when gas is relatively cheap, because there can be little improvement made in the thermal efficiency with such a heating cycle, and because of the large loss of heat stored in the oven walls at the end of the baking day.



Stationary Flat Hearth—Indirect Gas Oven of light construction in a Pastry Bakery

Another type of heavy brick oven, difficult to convert to gas, is the continuous indirect peel oven. These are continuously fired in one fire box feeding a series of flues under the hearth and above the crown. Due to the heavy construction, with large stored up heat loss at the end of the day, this type oven is not usually built for gas.

If gas were to be used the oven would be either direct, or would be indirect but of light construction, for instance sheet metal, insulating and firebrick. A picture herewith shows an indirect gas fired flat hearth oven of such construction, having a capacity of nine 18 by 26 inch bun pans. It is used mostly for cakes and pastries, so no steam is used with it. Such ovens are made with hearths from 5 by 5, to 12 by 14 feet. Ovens of nearly the same size, and constructed of the same materials are also made for direct gas firing. They are fired by 3 or 4 atmospheric burners firing under the hearth. Such ovens sometimes are double decked in order to conserve floor and peel space, in which event the burners are under the lower hearth.

The bakers peel, is a long handled flat surface, usually of wood, which he uses to load and unload ovens, particularly those with large flat hearths. The handle must be long enough to reach the rear of stationary hearths, and the center of rotary hearths. Much space is required to handle such peels when they are removed from the oven.

Rotary Flat Hearth Ovens

The rotary flat hearth oven is made in both heavy brick, and light construction. Gas is used in both types, though within the last few years the trend has been

very much to the latter construction. Ovens of this latter construction are called portable, because they can be readily dismantled and moved. Due to their lighter construction, they can be built on ordinary factory floors good for 125 pounds per square inch. Brick ovens must be built either on the ground floor or on heavily reinforced floors. If these ovens are fired with gas they are usually direct, but if other fuels are used, are likely to be indirect. If fired with a solid or liquid fuel, they probably have only one furnace; but with gas, they have two fire boxes, or 4 burners distributed under-

Reel Oven Used for Cookie Baking

neath the whole hearth. If gas is supplied to two fire boxes, atmospheric gas is used through nozzle type burners, 3 or 4 to each fire box. A recent design consists of 4 bent bar burners entering from the front of the oven, and continuing to the back, being located and bent so as to distribute the heat equally. Due to the length of these burners they use gas at from ½ to 1 pound pressure, injecting the air required. With the very even heat distribution obtained it is not necessary to rotate the hearth continuously, so it is moved manually, just enough to bring the desired portion of the hearth before the door for loading or unloading. If the oven is fired from two fire boxes, it will be continuously rotated by an electric motor, so that the product will be evenly baked, though the burners do not distribute the heat equally.

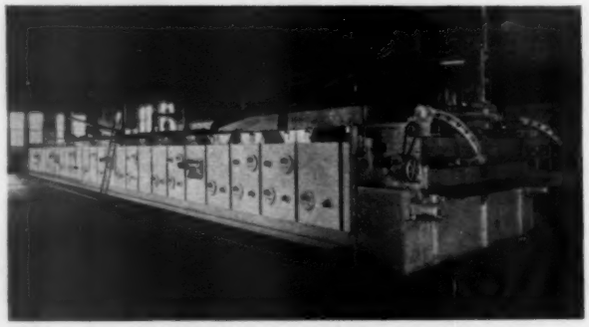
The rotary ovens are built from 10 to 16 feet in hearth diameter. Their hearths are of some material such as soapstone, which will give a good bottom bake. Their effective hearth areas vary from 50 to 150 cubic feet, and they have about 3000 B.t.u. burner capacity per square foot hearth area. Such ovens are extensively used for bread, cake, and pie baking, and less frequently are used for baking of meat and other food products. The time required for baking is not the result of the type of oven, but of the type of product baked, its size, and the mixture of its constituents.

Reel and Truck Ovens

Other types of ovens used in the baking industry; and also for baking meats, and similar foods; are the reel, and truck ovens. The reel oven, of which one is pictured, consists of a large reel which supports trays upon which the material to be baked is placed. The reel is motor operated. This oven is made in sizes for from 80 to 480—one pound loaves of bread. They will accomodate from 40 to 240 pies, or from 64 to 368 five pound meat loaves. They have heavy tile linings and a tile baffle over a large number of atmospheric bar burners extending from front to back of the oven. The truck ovens are of the same type extensively used for industrial baking operations, that is, a box-like oven into which a truck can be rolled. This type oven is used particularly in the meat industry, since by the use of two trucks, the meat loaves can be made and piled on one truck, while the oven is baking the load on the other truck. This permits making the meat loafs and filling the pans, not immediately adjacent to the oven. After baking, the finished loaves can be handled with equal efficiency.

Tray Ovens

When the baker's output is sufficiently large, he will use none of the types of ovens described, but will use a traveling oven. These are made in two general types, the tray and the flat hearth oven. The tray oven is characterized by a hearth consisting of a number of trays, which move through both horizontal and vertical passes in their course of travel. This type oven is loaded and unloaded at the same end. It is particularly advantageous in that it has a large output in proportion to the floor space required. The tray oven is normally built in sizes from 1000 to 2500 loaf capacity, most frequently about 1500 loaf. An oven of about 1500 loaf capacity will be about 13 feet high and take up a floor space of only about 11 or 12 feet, by 20 to 25 feet. Quite frequently one of these ovens will replace about 3 of the stationary or rotary hearth ovens, with increased output, and a great reduction in floor space, which becomes available for other bakery processes. Tray ovens are very flexible in operation, and are used to bake all types of goods.



Large Flat Hearth Travelling Oven, Fired by Radiators

There have been great changes in the design of traveling ovens within the last few years. Originally these ovens were built of brick, but recently the trend has been toward metal construction with the use of insulating and firebrick only. As regards burner systems the changes have been even greater. At one time the steam pipe oven was in favor. This consists of the use of sealed steam pipes under the hearth and in the top of the baking chamber, with these pipes or coils ending on a furnace outside of the oven proper, where the fuel is burnt, and the heat transferred to the coils. Then the trend was to the use of direct gas furnished at a pressure of about 3 pounds, or gas and 1 pound air, burnt in bar burners extending crosswise of the oven, over and under the moving hearth. The most recent trend is toward the use of indirect heat, that is, gas burnt in a large number of radiators, such as pictured; or burnt at one or two locations with a large quantity of air, and these diluted products circulated through heat exchangers in the oven.

This trend has also included automatic control, often of individual sections of the oven; and the reduction to a minimum of the explosion hazard through the use of thermostatic pilots, and explosion reliefs. This indirect construction results in an economy of steam. An indirect tray, of 900 loaf capacity, requires about 15 horsepower of steam. Approximately the same size oven, if direct, would probably require at least 50 per cent more steam.

Large Travelling Ovens

The largest bakers use travelling ovens, with a flat hearth which is loaded at one end and discharged at the other end. The bread being baked travels directly through the oven on the same horizontal plane. These ovens may have any of the combustion systems just discussed. The accompanying picture shows a travelling oven approximately 110 feet long, and the sketch shows the method of applying gas through radiators. The 110 foot oven has six sections, each controlled independently. There are thirty radiators with two burners per radiator. The large travelling oven is the most efficient type of oven, and when used for a long baking day, results in very low gas consumption per pound of bread. The following tabulation shows the economy of operating such an oven a large number of hours:

Hours Operation	B.t.u. of gas Perp Pound Bread
2	707
4	525
6	456
8	430
10	408
12	398
14	387
16	381
18	375
20	369
22	363
24	358

The modern oven of this type is well insulated, and so, cools slowly. In a 23 hour shut down, with a room temperature of 83°, the oven temperature fell from 448° to 269°, or at the rate of less than 8 degrees per hour. After falling to 269°, such an oven can be reheated to a baking temperature of 410°, in 2.3 hours with the use of only 3,250,000 B.t.u. Such large travelling ovens bake about 5,000 pounds of bread per hour.

Specialized Baking

Some specialized products, such as pretzels, are baked in ovens of the types here described. In some cases pretzels are produced in quantities sufficiently large to permit the use of flat hearth travelling ovens. Some other bakery products are not here considered, since they are not baked in ovens. Crullers are fried in grease, not baked. Ice cream cones are baked, but in very specialized machines, rather than ovens.

By-Product Coke in 1931

PENNSYLVANIA, as in other late years, was also the largest producer of by-product coke. The output of its by-product ovens in 1931 was 7,519,000 tons. As a producer of by-product coke, Ohio ranked second, New York third, Alabama fourth, and Indiana fifth. The details are given below.

Production of By-Product Coke, by States, in 1930 and 1931 (Net tons)

State	1931 *a*	1930	Increase or decrease 1931 Tons	Per-cent
Alabama	2,948,399	3,986,920	— 1,038,521	—26.0
Colorado	225,760	379,070	— 153,310	—40.4
Illinois	2,461,217	3,576,577	— 1,115,360	—31.2
Indiana	2,757,040	4,984,620	— 2,227,580	—44.7
Maryland	818,107	1,169,016	— 350,909	—30.0
Massachusetts *b*	1,249,313	862,663	+ 386,650	+44.8
Michigan	2,501,571	2,603,815	— 102,244	— 3.9
Minnesota	443,915	641,205	— 197,290	—30.8
New Jersey	939,572	918,814	+ 20,758	+ 2.3
New York	3,478,307	3,849,563	— 371,256	— 9.6
Ohio	3,960,007	6,163,324	— 2,203,317	—35.7
Pennsylvania	7,519,183	12,529,255	— 5,010,072	—40.0
Tennessee	86,337	100,439	— 14,102	—14.0
Utah	164,777	225,361	— 60,584	—26.9
Washington	29,664	36,221	— 6,557	—18.1
West Virginia	1,258,837	1,479,431	— 220,594	—14.9
Connecticut, Kentucky, Missouri, Rhode Island and Wisconsin	1,612,598	1,689,411	— 76,813	— 4.5
Total	32,454,604	45,195,705	—12,741,101	—28.2

(*a*) From monthly reports furnished by operators. (*b*) Includes an unknown amount of breeze.

There were no new by-product coke plants starting operation during 1931. There were, however, three new installations of ovens at existing plants which were fired during the year, as follows: In January the Consolidated Gas Company added 37 Koppers ovens to its equipment at Hunts Point, N. Y.; in the same month the Hudson Valley Fuel Corporation fired 31 new Koppers ovens at Troy, N. Y.; in November there were 25 Semet-Solvay ovens added to the plant of the Ironton By-Product Coke Company at Ironton, Ohio. The total number of ovens added by these operations was 93. In addition, 295 new ovens were completed at four of the existing plants, but not put into operation. No new ovens were under construction at the close of 1931.

Including the new ovens completed in 1931 but not fired, the potential coking capacity of by-product plants at the close of the year, at 100 per cent operation and with all conditions favorable, amounted to nearly 64,000,000 net tons. At this rate the plants in existence have a carbonizing capacity of 91,000,000 tons of coal.

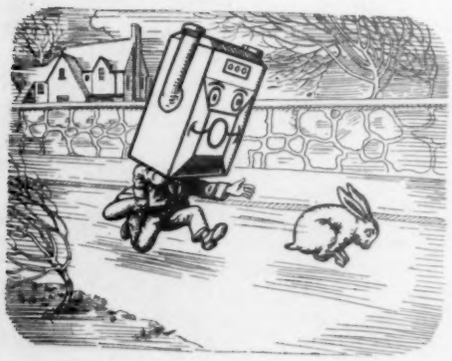
Accurate statistics on the recovery of by-products from coke-oven operations in 1931 are not yet available. The following preliminary estimates are obtained by assuming that the quantity of by-products recovered during 1931 bore the same relation to the known production of coke in 1931 as in 1930:

Tar	431,646,000 gallons
Ammonia (sulphate equivalent of all forms)	1,103,457,000 pounds
Gas	519,274,000 M cu. ft.
Crude light oil	128,196,000 gallons

Allowing for imports and exports and for changes in producers' stocks, the indicated consumption of coke in 1931 was 31,917,126 tons. Of this, about 18,700,000 tons was consumed by blast furnaces in the manufacture of pig iron. The remainder was used in foundries, in smelting the non-ferrous metals, in the manufacture of water gas, in miscellaneous other industrial uses, and for domestic heating. In 1931 the quantity consumed for these purposes was about 13,217,126 tons, or 41.4 per cent of the total, as against 8,221,000 tons, or 18.1 per cent, in 1913.

The consumption for house heating cannot be stated accurately until the detailed reports of operators are received, but it was probably as great, or greater than in 1930. In that year 7,886,432 tons of by-product and 141,391 tons of beehive coke were sold for domestic use, a total of 8,027,823 tons. —*U. S. Bureau of Mines.*

AMERICAN GAS MERCHANDISING ALMANACK



1932

March

FOLKS may be induced to enter your store if you make a bid for them.

As it is most essential that you have prospective purchasers see your wares, why not run a Toaster special during March. Play-up the goodness of toast for breakfast, of toasted sandwiches and advertise gas toasters at a special price as a store special. Pile one of your windows full of toasters; give special toast recipes to any one who will visit your store and ask for them. Have your home service department make toast daily and tell folks how much better gas toasts bread than any other fuel.

March is the month that blows many prospective purchasers to the gas appliance dealer who is on his toes and offers them a reason for visiting his store.

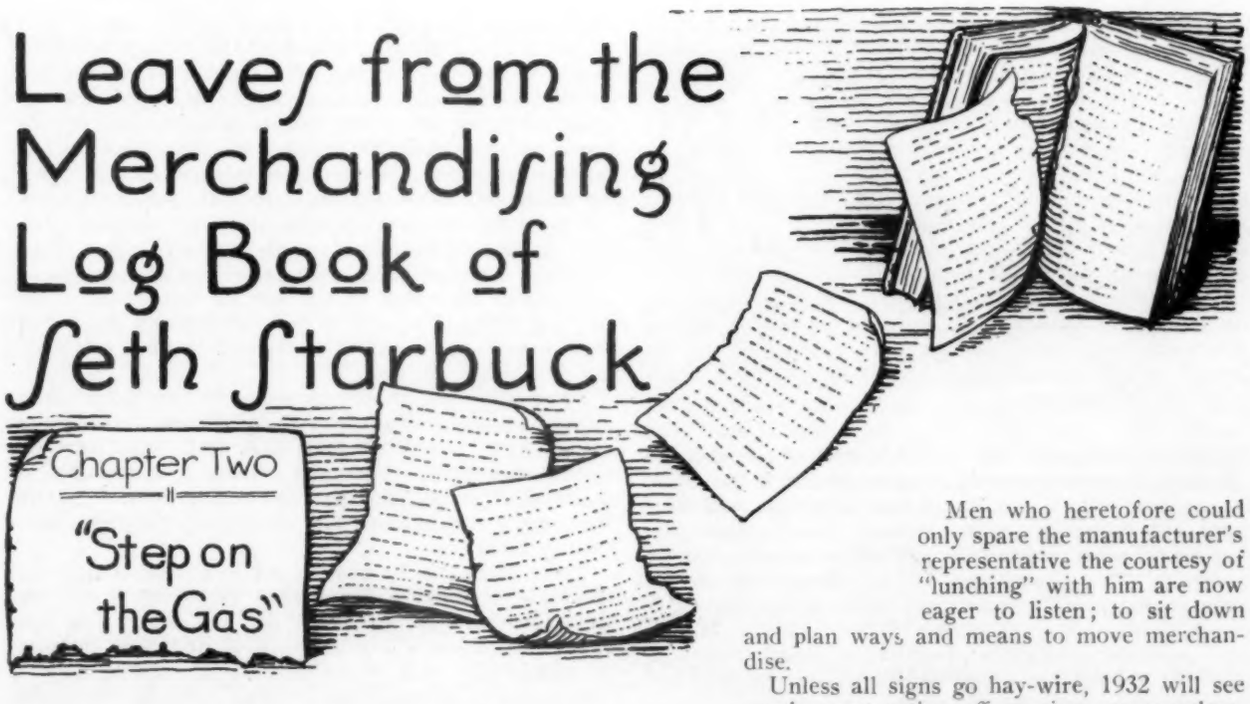
March finds many folks thinking of house cleaning, of moving to new homes. March is what you make it, a good month or a mediocre one, depending upon how you advertise and expose your wares to sales.

Read the ideas offered on the following pages, ideas that may be used by you to promote the sale of gas appliances and arouse interest in gas as a fuel for many household tasks—then plan your activity.

Merchandising in 1932 will more than ever depend on new uses for old products or old products "dressed up" in new dresses. 1932 will find more home managers being sold "style" than ever before and more of them seeking dollar values for dollar expenditures. High-pressure is out and selling from catalogs and through the aid of chin-music is passé. In the year 1932 you will also find that more and more store purchases will be made.

1—Tues.	Check over window and sales floor displays.
2—Wed.	Send advertisement to newspaper for publication in food section.
3—Thur.	Conduct demonstration on sales floor.
4—Fri.	Knute Rockne born, 1888. If window displays are to be changed go over plans, see that merchandise, cards, drapes, etc., are all at hand in order that displays may be installed tomorrow for Saturday night and Sunday window shoppers.
5—Sat.	Check proofs for Sunday advertising.
6—Sun.	Massacre at the Alamo, San Antonio, 1836.
7—Mon.	There will be an eclipse of the sun today. Check over replies or inquiries received from inserts sent out with customers' accounts.
8—Tues.	Stamp Act passed 1765 by English House of Lords. Tell salesmen of the importance of trying to bring prospective purchasers into the store to see your merchandise and make purchases.
9—Wed.	Go over advertisement to be run in newspaper.
10—Thur.	Mexican treaty ratified, 1848. Usually a discount day; have special store demonstration.
11—Fri.	Ascertain what inquiries you may have had from bill inserts.
12—Sat.	Steward Edward White, author, born, 1873. If you are to put in a window for St. Patrick's Day check over plans to see that everything is at hand and ready for the display man.
13—Sun.	France announced treaty of alliance with the United States, 1778.
14—Mon.	Go over first half of month's efforts and results with salesmen.
15—Tues.	Recheck plans for balance of month, check quotas and decide what may be done to attain those that are running short.
16—Wed.	James Madison, President, born, 1751. Check-up on advertising; ascertain if floor sales people can trace any sales direct to Food Page or Women's Page advertisements.
17—Thur.	St. Patrick's Day. Plan to take out St. Patrick's window and install an entirely new display. You may feature Lenten dishes, and the gas range that makes them easy.
18—Fri.	Grover Cleveland, born 1837. Check over advertisement to be used in Sunday newspaper and if your store and window displays have been rearranged, go over them very carefully to see that all is in order.
19—Sat.	W. J. Bryan, statesman born, 1860.
20—Sun.	Palm Sunday, Spring begins, 2:54 p. m.
21—Mon.	Plan to have a number of store demonstrations during the balance of the week and advertise your program.
22—Tues.	Let your home service department conduct a demonstration called a day of "Meatless Menus."
23—Wed.	Breakfast breads may be the item on today's demonstration.
24—Thur.	Rhode Island purchased from the Indians, 1636. Dainty Desserts may take its place on today's demonstration.
25—Fri.	Good Friday. Feature Hot Cross Buns on today's program.
26—Sat.	Last day for installation of special Easter display.
27—Sun.	Easter Sunday.
28—Mon.	Time to line-up your plans for April.
29—Tues.	General Foch made Commander-in-Chief of Allied forces, 1918.
30—Wed.	Install April Window Display Advertisements; line-up April plans to release tomorrow.
31—Thur.	Battle Five Forks, Virginia, 1865. Fire the big guns to open the Big April Feature.

Leaves from the Merchandising Log Book of Seth Starbuck



AFTER all, the best thing one can do when it is raining, is to let it rain."—*Tales of the Way Side Inn.*

Roxy, orchestra conductor and showman extraordinary, said that the thing to do when you are trying to negotiate a steep hill in your gasoline chariot is "to keep your foot on the GAS." A bit of homely philosophy that a number of folks seem to have entirely forgotten during the past months. When stocks relatively ceased to bound and rebound, and bound again, several months ago, a lot of folks entirely forgot that feet were given them for action, when running the business-buggy, and sat without using them; thinking no doubt that the solution to vexing problems was just around the corner and would be forthcoming most any time.

Gas men have sensed this. They understand that the fellow who sits still goes backwards; he sells no merchandise; he helps no situation; nor does he create a demand for bigger and better gas holders. Sitting, as we said in the AMERICAN GAS JOURNAL, October issue, 1929, has become an obstinacy. Not only that, but in many quarters it's developed a perverse pleasure in pessimism on the part of many who only a short time ago were paraded about as "pep-artists-personified." Now we are approaching the buying season of a brand new year. We are going to have to give and take; we are going to be taxed and tried; yet, we will go over the top, if we will but keep our foot on the gas, push and persevere.

IN talking to gas men from all sections of the country we find that by and large, the industry has weathered the storm up to now, in a commendable manner. Merchandise stocks are in better condition than they have been for a decade. Organization personnel has been righted; much deadwood, that floated with flood-tide is out of the picture. Accounting methods have been revamped and brought up-to-date. Management has had much time to look back, time to read and study plans that have spelled success even in a slumped market and NOW the word goes out; "Keep Your Foot On The Gas."

Men who heretofore could only spare the manufacturer's representative the courtesy of "lunching" with him are now eager to listen; to sit down and plan ways and means to move merchandise.

Unless all signs go hay-wire, 1932 will see much constructive effort given to merchandising. Many gas appliances, that heretofore have been treated like step-children will take their rightful place at the family board. The gas man is looking for load and he is going to keep his foot on the GAS. He has come to realize, that after all, gadgets do not build a load and that his job is one of selling incinerators, refrigerators, dryers, automatic heaters—appliances that serve the customer and cause him to appreciate that when heat is required you can do it better with GAS. Why, fifteen million women who will cook with nothing but gas will demand a silent gas refrigerator, and automatic hot water service as only the gas heater can supply it.

MANUFACTURERS have learned the meaning of obsolescence of ideas of demands and are consigning many old models and methods to the scrap-heap. They are aware of the fact that the feminine viewpoint is to be reckoned with when building home appliances and in planning showmanship to promote their wares.

These are the men who have seen the wisdom of adapting themselves and their merchandise to change, to the trend of the times.

Instead of trying to force a market, as did the storekeeper of the naughty-nineties, these men are striving to anticipate what the great American purchasing agent is going to demand next, in the matter of design, color and material, and supply it. The woman in the home has learned how to get what she wants when she wants it, when she is convinced that it has value. Sometimes the actual purchase may have to be deferred, but if "it's the thing" and may be purchased at a fair price, eventually she will own it.

Gas men are the logical merchants of home appliances despite the wave that is temporarily tempting some to explore other avenues for the resale of such items, and many are carrying on.

Others have given up the trial and error method, if you know what we mean, and are either going ahead doing a job of selling predicated on the Golden Rule or are securing the support and co-operation of other

agencies on a fair plan basis worked out at a round-table discussion. Such methods of selling appliances are not new—simply ideas that sold gas lighting and box ranges in the days of yore, a bit polished.

From the hinterlands and from coast to coast many gas men are making commitments that anticipate an "above the twenty-nine, thirty volume" of sales of all the "bread and butter" appliances and for some unusual sales on some of the load-building items. The latter, it is said, will be subjected to intensive sales promotion in many sections during the coming months.

It is expected that several groups and sectional activities to promote the sale and more generous use of automatic hot water service, gas refrigeration, gas heated laundry equipment and home heating, will bloom with the Springtime.

THESE activities will no doubt lead to much in the way of manufacturer's cooperation. It is our opinion that the day is not far distant when gas will flare forth in popular women's magazines in a manner that has made many another service and product a family favorite. This advertising will be planned in such a manner that it will permit the local or independent gas company or dealer to secure a local tie-in. It will also cause the appliances advertised to invade new outlets that should be selling such appliances today; approved appliances, we refer to.

1932, as we view it, will see steps taken to outline activities of two, three, four and five years duration. These plans will be financed on a meter basis and at such a reasonable cost per meter that even the small independent gas companies will find it to their advantage to participate.

If the past months of slack times did nothing else they afforded the thinking gas man an opportunity to check-up on many old policies that were worm eaten and were working against him. It also gave him an ideal opportunity to test the ability of his co-workers to sit tight and to adapt themselves to change, to keep their feet on the gas.

FROM information coming to us we expect to see gas appliances subjected to special, spectacular, steady and consistent sales efforts during the coming months. We expect to see special drives devised to arouse a general community interest in certain appliances. These activities will be full of showmanship and will be built around organization-wide activities with a view of interesting many employees who heretofore regarded the selling end of the business as a blamed nuisance and a thing to be sneezed at. These plans for employee activities during 1932 and hereafter, will first of all afford employees an opportunity to purchase appliances on a special employee-user-basis and be followed by an activity that looks to enlisting his loyal support in making a predetermined sales quota. This will be accomplished by offering a special cash commission for leads that he develops and which are closed by regular sales people. These activities will prove most helpful. They will teach the gas company employee to understand the value of gas service first hand. They will teach him to be able to talk intelligently about both service and appliances, the monetary reward will make him anxious to do so.

Such activities should prove very profitable from every standpoint. They will be instrumental in building sales based on an understanding and from word-of-mouth advertising. They will develop a "know why" in the mind of employees that will enable them to handle their work and to serve the customer in a most satisfactory manner.

These plans will be worked out in a manner that will eliminate, in a large way, many false moves that entered into "campaigns" in the days of not so long ago. First, the market will be determined, and next, the plan of attacking it will be predeveloped, starting with a "know your merchandise activity" among the sales force, and in turn, the office, shop, construction and distribution employees. This done, the sales force may concentrate their activities on the "picked prospects" developed by house-to-house surveys and on such other prospects as are developed by employees and through advertising.

THESE special "drives" will be staged to run-up a large per cent of the year's quota in a short period and for the purpose of developing leads that may be closed from time to time throughout the year. In other words, while a quota will be set-up at the outset of the year by months, the "drive" will be the factor of safety employed to insure its accomplishment.

The monthly quota will be devised wholly to take care of expected business, with the drive as the push to take up slack or even put over a quota. The big idea behind the plan however is that it is laid out in a manner that warrants a consistent plugging on the part of the sales force at all times, for the reason that all activities are more or less continuous or are the means of supplying prospective purchasers for all seasons.

Starbuck's Rebus—Answer on page 63

Safe Utilization of Natural Gas

(Continued from page 45)

invaluable, since each employe thus comes to understand the problems himself and at the same time develops the ability to convey the knowledge to others.

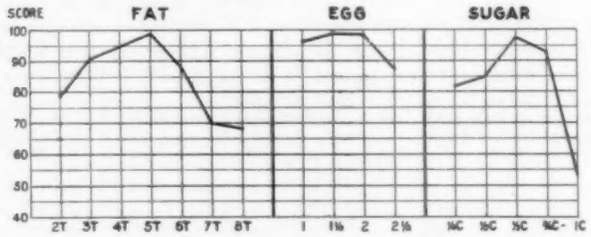
The fourth specification is a constant war against leakage. Modern devices such as the combustible gas detector and the use of an odorant in the gas, permit us to locate the leakage. The rest of the story is continuous vigilance and maintenance.

The fifth specification is controlled and reliable operation of the transmission and distribution lines. This requires adequate regulating stations and continuous vigilance.

The sixth specification is correct appliances, correctly connected and adjusted. It requires experiment and testing; engineering skill must be employed in many installations. It requires cooperation with civic agencies and underwriters. It requires inspections and quick handling of service calls.

Cake Baking Research

THE Research Department of American Stove Company has recently concluded some interesting tests on the baking of layer cake, the same having been conducted under the direction of Dorothy E. Shank, Director of this company's Research Kitchen. These tests are given in detail in Bulletin Number 40, Research Department, American Stove Company; below will be found a summary of the findings.



Curves Showing Relative Desirability of Plain Layer Cake Determined from Score Card.

T—Tablespoon; 14 grams to the spoonful.

C—Cups; 200 grams to the cup.

Increasing ingredients beyond amounts required to produce practically perfect cakes results in poorer textured cakes than when too small an amount is used.

There are many recipes available for layer cake; and from a great number, one which we have used for a number of years with considerable success, was chosen as a basis for study.

We were interested to learn the effect of baking cake at different temperatures and times to determine the proper baking temperature and time; of varying the proportion of ingredients used; and the effect baking in pans of different materials has on the color and thickness of the crust, and on the texture of the crumb. A uniform method of procedure was standardized and all factors were kept constant with the exception of one factor which was varied, only one being varied at a time.

It was found that 375 degrees for 30 minutes produces the most satisfactorily baked cake. Temperatures lower than that chosen for the best result produce a loose, coarse and dry texture, while the higher temperatures have a tendency to brown the crust too much; make the cake rise higher in the center, and produce a tight and tunneled texture.

It was found that cake baked in an aluminum pan has a slightly lighter color and a thinner crust than that baked in tin, while an enamel pan produces a browner and thicker crust than either the aluminum or tin. There is no appreciable difference in the color of the tops of the crusts, the difference being noticeable in the lower crusts and sides where the cakes come in contact with the metal. The texture and shape of cakes baked in aluminum and tin are satisfactory. However, cakes baked in enamel do not rise evenly and have an uneven texture.

When the ingredients were varied one at a time it was found that too small an amount of fat makes a coarse texture and a crust too light in color. With an increase in the amount of fat over that which produces the optimum cake the texture becomes compact and sticky.

Fats other than butter will produce satisfactory cake textures, but when butter is used the flavor is improved and the texture seems somewhat finer and softer.

In a butter cake, eggs are used to produce a fluffy texture. Increasing the number of eggs over that necessary to produce a satisfactory texture causes a blistered crust and too loose a texture.

As sugar is increased beyond the amount necessary to produce a satisfactory cake the crust becomes browner but the texture becomes loose and the cake falls apart easily. If too little sugar is used the cake does not rise as well as with an optimum amount of sugar and the crust is less brown.

The temperature of ingredients may vary from refrigerator temperature to room temperature. The number of degrees of difference will depend on their storage place. Temperature differences of ingredients will cause a difference in manipulation. If the fat is at room temperature it is more easily creamed and in less time than if taken from the refrigerator. The sugar will dissolve in it more easily than when it is very cold. Milk used at refrigerator temperature sometimes causes a curdled appearance of the batter. The texture of cake made from room temperature ingredients is a little more even, not as blistered or as cracked, as when cold batter is baked.

Dealer-Cooperation Shows Phenomenal Gains During 1931 in Face of Adverse Conditions

IN spite of the adverse business conditions which characterized the year just ended, the Brooklyn Union Gas Company's dealer-cooperation activities met with phenomenal success during 1931. Remarkable gains were made, both in the amount of appliances purchased by dealers and in sales resulting from dealers' leads.

Dealers purchased $387,177.07 worth of appliances from this company, an increase of $147,580.29, or nearly 62 per cent, over the total for the previous year. This class of business averaged during 1931 in excess of $1,000 a day for every day in the year, Sundays and holidays included.

The following table showing the purchases by months reveals that gains were made each month over the corresponding month in the previous year:

	Dealers' Purchases			
	1930	1931	*Increase*	*Gain*
January	$ 8,692.02	$14,817.09	$ 6,125.07	70%
February	9,634.63	10,524.80	890.17	9%
March	13,628.69	26,514.74	12,886.05	94%
April	22,282.61	29,966.07	7,683.46	34%
May	24,474.30	31,268.33	6,794.03	28%
June	18,981.03	29,746.43	10,765.40	57%
July	16,380.33	32,253.89	15,873.56	97%
August	16,181.77	34,997.11	18,815.34	116%
September	28,614.17	53,520.03	24,905.86	87%
October	36,311.13	49,745.78	13,434.65	37%
November	23,639.26	38,601.65	14,962.39	63%
December	20,776.84	35,221.15	14,441.31	70%
Totals	$239,596.78	$387,177.07	$147,580.29	62%

The other phase of the dealer-cooperation movement showed even greater gains. During the year just ended this company sold $243,145.72 worth of appliances to customers whose names had been furnished by dealers. This class of business increased 93 per cent over the previous year's total, which was $125,878.41.

During 11 of the 12 months in 1931 sales resulting from dealers' leads exceeded those for the correspond-

ing month of the previous year, as is shown in the following table:

	Sales Through Dealers' Leads			
	1930	1931	*Increase*	*Gain*
January	$ 7,422.94	$18,183.25	$10,760.31	145%
February	2,666.17	4,867.80	2,201.63	97%
March	4,286.56	22,174.23	17,887.67	417%
April	5,007.40	7,308.15	2,300.75	40%
May	14,121.66	5,677.39	.....	.....
June	14,900.63	23,081.17	8,180.54	54%
July	8,233.66	22,087.30	13,853.64	124%
August	6,084.13	25,599.10	19,514.97	321%
September	17,360.84	34,877.08	17,516.24	101%
October	24,775.90	31,591.86	6,815.96	27%
November	12,338.20	25,015.89	12,677.69	103%
December	8,680.32	22,682.50	14,002.18	161%
Totals	$125,878.41	$243,145.72	$117,267.31	93%

September was the best month for sales resulting from dealers' leads, but it was not until the following month that dealers made their heaviest purchases.

The dealer-cooperation campaign was conducted along three "fronts" during the past year. One involved the consistent use of the Great American Servant symbol, another consisted of special educational courses for the dealers, and the third was concerned with an extensive advertising campaign.

The advertising campaign included the use of billboards at 156 locations in Brooklyn and Queens, to promote the dealer-cooperation movement. Since last July these billboards have carried monthly messages on "Gas, the Great American Servant," which have served to inform the public that the dealer displaying the Great American Servant symbol is an authorized representative and sales ally of this company.

Gas Water Heater Display

THE Hot Water Shower background, is just another example of effective eye appeal in presenting the storage gas water heater.

It would be hard for anyone to pass a window display like this without noticing the head poking through the curtains. Then the spray of water from the shower head, leads one to at least think of a refreshing shower bath. The eye naturally wanders to the neatly worded copy and then to the appliance, itself. Price, terms and service are shown at last on a small readable card near the appliance.

This type of window, arranged by Public Service Electric and Gas Company, Newark, is bound to produce sales.

Tests—for Proficiency, Capacity, Aptitude

"There are in existence a number of tests for proficiency and for capacity which are reliable and well validated. On the whole, the former group, those for proficiency, such as typing and stenographic, machine operation and bookkeeping tests have a higher degree of validity and reliability. Tests for capacity or aptitude, such as learning-ability, general intelligence, adaptability, etc., are less reliable.

"Among the tests for which norms have been well established and which are easy to administer are Otis Higher Form A, Benge Clerical Test K, and Thurstone Employment Tests. However, it is well to bear in mind that indiscriminate use of tests and amateur interpretation of test scores may do more harm than good. In their present stage of development, and in use outside of the professional testing laboratory, test results would be considered by office executives only as 'straws indicating the direction of the wind,' never as anything more.

"One cause of high turnover is discouragement, due to several secondary causes among which may be listed:

"Inability to understand the work.

"Lack of vision regarding the company's business.

"A feeling that the company has 'no interest in the employees.'

"Inability to 'get along' with management.

"Can it be doubted that if an adequate system of training is provided, these causes of discouragement will be mitigated: that such a program will be an evidence to the office employees of the company's interest in their welfare, the company's desire to provide means of most quickly making adjustments to the new work possible and the company's desire to take the new employee into confidence. A systematic training program is an evidence of good faith on the part of management and goes far in eliminating causes of discouragement. It is therefore an instrument useful to management in decreasing labor turnover.

"Rate of production and percentage of errors are universal measurements of the degree to which office management is successful. New employees are burdens in an office where high production is required, because of the length of time required to bring these new employees to a point whre they can shoulder their share of the work. Management, not the new employee, is at fault if this period is in general, too long, because an adequate training program will shorten the breaking-in period."—*F. G. Atkinson, A.G.A. Convention, 1931.*

New England Gas Association Holds Sixth Annual Convention

Merchandising and Management Subjects Receive Major Attention

WITH some five hundred gas men in attendance the Sixth Annual Convention of the New England Gas Association met at the Statler Hotel in Boston, February 3rd and 4th. This attendance mark, it is especially well to note, was quite up to the average and demonstrates a spirit to carry on the part of the New England gas fraternity, despite the status of general business.

Although the technical phase of gas procedure was not touched upon, by way of papers and addresses, the merchandising and management aspects received careful attention and points were brought out that should be of much interest to all gas men, regardless of their particular class of work.

The usual fine dinner, which was of an informal nature, added a touch of fellowship to the occasion and was well staged by the committee. The decorative effect on the tables is worthy of mention; each table had burning in replica the gas flame that is on top of Boston Consolidated's building. These imitation flames were quite effective in the partially darkened dining hall.

The new officers elected for the coming year were as follows:

Isaac T. Haddock, President
Harold R. Sterrett, First Vice-President.
Fred M. Goodwin, Second Vice-President.
F. D. Cadwallader, Treasurer.
C. D. Williams, Executive Secretary
R. L. Fletcher, David Daly, John West, W. F. Norton, R. H. Knowlton } Directors-at-large
H. G. Taylor, Chmn., Operating Div.
J. J. McKearin, Chmn., Sales Div.
C. S. Hilton, Chmn., Industrial Div.
Geo. S. Lees, Chmn., Accounting Div.
A. L. Slattery, Chmn., Manufacturing Div.

President M. B. Webber spoke hopefully of the future of gas and touched upon the various influences of competition and the existing status of business. He said in part:

"The accomplishments and contributions to the progress of any industry are made through individual effort, but we should not forget that individual effort is of little value unless backed by knowledge, experience and contact with sources from which assistance in the formulation of ideas can be drawn. In short, individual effort to be effective must rest upon the spirit of co-operation.

"We are concerned principally with creating conditions which will cause humanity to take continued advantage of the service which we have to offer, despite competition and economic changes which we have to offer, despite competition and economic changes which have and may occur.

"That this is entirely possible is evidenced by the fact that many concerns who were engaged in producing materials of war have successfully adapted their industries to the necessities of peace. So, we should regard competition as a spur to our initiative and as an asset to our business, and welcome it in the interest of progress.

"The economic or industrial revolution which started in 1929 is being followed by a social revolution in the form of the day-by-day, month-by-month change in our social values and outlook which should make it easier for the average citizen to pool his interests to better the position of his industry and community. I hardly need to specify the thousand and one ways in which industry is competing with industry, not company with company. Oil, gas and coal are fighting for the privilege of heating the country. Mechanical refrigeration is competing with ice for cooling. Lumber competes with a hundred other varieties of building material—concrete against brick, asbestos against cedar shingles, metal lath against wood, wall board against plaster, and in the clothing industry, rayon or wood fiber against silk, cotton or wool.

"The weapons of industry include research, publicity, the elimination of waste, uniform industry practices, and the working together by individuals for the common good."

Address by Gallagher

R. W. Gallagher, President, American Gas Association, was unable to attend, however his address was read and it contained sound advice as to our keeping our heads in the present depression and not being led astray by wild theories. Some of his comments follow:

"I think it is the part of good judgment not to be carried away by varied opinion and immature judgment on the question of economic changes. Our obligation to the public which we serve, to our companies, and to ourselves, requires, I believe, the maximum application of our energy and thought to each problem as it arises and to each day as it dawns. Our present situation will not be helped by looking backwards or by speculating on matters and conditions.

"Our company problems, our personal problems, and our regional problems are best known to each of us respectively. I would not, of course, have the temerity to tell you New Englanders how to run your business or your Association when the evidence is so clear and compelling that you know excellently well what that is yourselves, but over the entire gas industry of this country and Canada there are very pressing problems of a general nature which affect us all alike.

"The first of these, or at least it is the one most talked of today, is that of continued and increased presentation to the public of the gas idea. A phase of this, and perhaps the whole of it except in its mechanical execution, is the policy of a gas company to interpret the gas idea in every home, helpfully, practically and economically in ways that will best bring out the wonderful advance made by engineers in the science of heating.

"It may be that I am wrong in this, but I think the American public nowadays more than at any time are ready to be told what is meant by the term "modern gas service." I feel that the basic idea is already firmly planted in the public's mind that gas is heat, and of the advantages of cleanliness and convenience as compared with solid fuels. I believe it is becoming necessary that the gas idea be broken down and particularized in terms of definite meaning as applied to family, commercial and industrial uses.

"The gas idea means nothing; a full and complete knowledge and absolute acceptance of its clean and automatic convenience also means nothing; all that we have and that the public is willing and even anxious to grant us means nothing, unless we make it known to the particular family, or business, or industry, just how it can realize the advantages of modern heat, which, of course, is gas.

"I am pleading, therefore, as a groundwork, what many of us believe must be the means of continuing that progress which we have already so notably achieved. Gas values must be interpreted to individuals, whether a company, industry, or family, in terms that it can

understand. The same is true of all conditions and problems affecting the gas industry itself, which are of such a nature that the public must know about them for its good and our own. These too must be told in particularized and often localized terms of community understanding.

"I am aware that such a plan means the breaking down our work as an industry into many parts, but I am convinced that there is no one single formula which will solve all gas company problems, all community and utility problems, or all family heating problems, with one magnificent flourish.

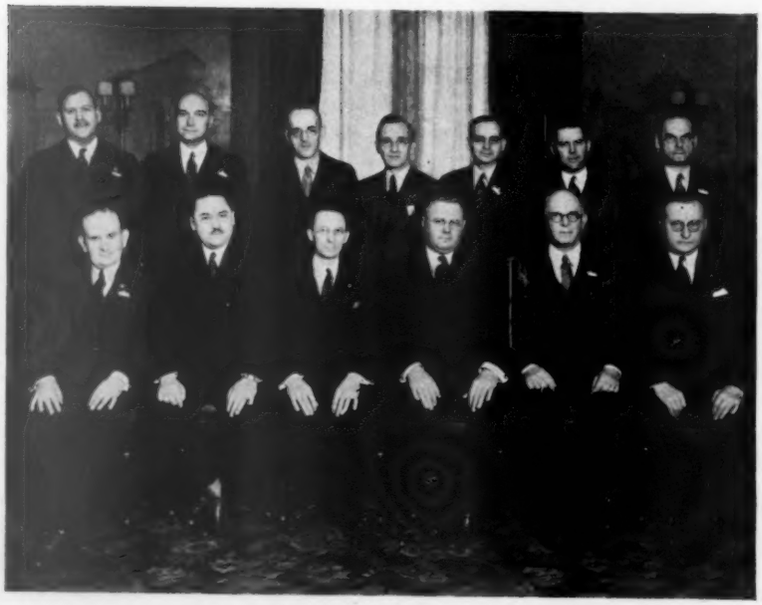
"The situation, as many of us view it, is one that requires careful study and effort on the part of everybody concerned. If this is true, and I believe it is, the value and the benefit of regional and sectional organization become transformed into a necessity, that is, a desirability becomes a necessity.

"In a long history we have repeatedly demonstrated our adaptability to successive changes. Through them all, and in spite of some of them, the gas industry records progress. In this century and especially since the close of the Great War, we have recognized new fields for the use of our product in almost every industrial operation using heat; we have developed a substantial and rapidly increasing house heating demand; we have done remarkably well under all circumstances with gas refrigeration. In mentioning these comparatively new uses, I do not overlook the much greater advances that have come from our aggressive marketing of appliances for use in cooking, water heating and space heating, and some advances in laundry work and incineration.

"In other words, the gas industry has kept abreast of the times and in many respects has kept ahead. This is an enviable record for an industry which has existed for many years and which has acquired a balance of conservatism.

"The industries that will lead in the near future and probably in the long future are those which resolutely pursue research both in the fundamentals of their existence and in the practical attainment of their possibilities. This is so clearly recognized that the financiers make the spirit of research a factor in their appraisal of future security values. The executive officers of a fixed investment trust recently organized, when selecting their portfolio of industrial securities, provided as the first requisite that companies appearing on its list must have adequate research programs, either individually or through associations.

"The gas industry began comprehensive and carefully planned research programs long before the economists grasped the essentiality of such procedure. Our Industrial Gas Research is now in its sixth year and upon its execution is concentrated our best thought. No matter what questions have arisen as to the relative importance of activities of the American Gas Association, our Executive Board has never questioned the necessity for industrial gas research and has resolutely maintained its program in both fair and foul wealth. Some day the gas industry will have good cause to remember with gratitude the work of Mr. Rutledge and his associates on the Industrial Gas Research Committee.



OFFICERS, NEW ENGLAND GAS ASSOCIATION
Left to right, standing: W. F. Norton, John West, Geo. S. Lees, R. H. Knowlton, J. J. McKearin, A. L. Slattery, H. G. Taylor. Seated: F. D. Cadwallader, H. R. Sterrett, M. B. Webber, Past President, I. T. Haddock, President-elect, F. M. Goodwin, C. D. Williams

"It is a mistake, of course, to conceive research as something purely technical. Just as careful and exhaustive analyses have been made in respect to problems of markets, sales management, salesmanship, employee-dealer relations and allied subjects, all of which give evidence for my thesis that the gas industry is going to continue to grow and develop partly because we persistently and thoroughly pursue policies of analysis of our present conditions and our future prospects.

"Another fine example of coordinated effort lies in the establishment, the growth and success of A.G.A. Laboratory which has in its testing and research programs been of exceptional service to the industry and to the public by bringing about the acceptance of appliances complying with nationally recognized standards of safety and operation thereby maintaining the industry's leadership in this line of endeavor.

"This train of thought naturally leads one to the record made by the gas industry of America through the American Gas Association in establishing its activities upon a definite basis of operation. I suppose everyone in the industry knows that we began in 1926 the formation and execution of a Five Year Program for Association Activities prepared by a Committee of leading executives headed by Hon. George B. Cortelyou. To that program the industry has adhered and all of its proposed activities have been judged in its light. It has been a sheet anchor in good times and in bad times. Upon the expiration last year of the original program a new plan for the next five year period was prepared and adopted under the leadership of your Mr. Dana D. Barnum as chairman. In doing so it was clearly shown that no change was necessary in the foundations and only such modifications in the superstructure as were suggested by changes of the nature that must come to any industry. The program, though not intended for every shift in the wind, still affords flexibility in execution, and the principles of 1926 are the principles of 1932.

"There are those who believe that there are today more difficulties in the way of our industry's advancement than at any time in a number of years. Some of this feeling is perhaps due to the mental attitude so general in these days; some of it is doubtless true. We are beset by competition in many forms and very many directions, until any one who in these times refers to the gas industry as a monopoly can provoke only a smile. We can meet competition by maintenance of service, by intelligent engineering, by thorough training and equipment of our representatives, by improvements in appliances, by adequate education of our public, and by adherence to the ideals of public service and social responsibility.

"These situations call for the qualities which we possess—constancy of purpose, stability, adaptability, education, research —and organization."

Adequate Service

H. S. Sterrett, in his paper, "Economics of Customer Service," stated that: "adequate service, cheerfully rendered is the greatest bulwark possessed by our industry in meeting the advances of competing fuels. The efforts of coal dealers in some sections, individually or in groups, to render customer service in the utilization of solid fuel; the service departments which have been established by the more progressive oil burner companies,—these are examples of attempts

to render a customer service both as a defense and as a promotional weapon, and they undoubtedly will be followed by others.

"Not only is good and complete service a protection to our present load but it is a most important factor in promoting the use of gas in competition with other fuels. In addition to other advantages which our product possesses, I believe that the general public in many cases adopts gas fuel because of the assurance of excellent service and because of the permanency of the company supplying it.

"Since the servicing of gas appliances is essential to the very life of the industry—for without adequate servicing a rapid decline in the use of gas would inevitably occur—and since gratuitous service is very generally given and expected, and the cost of such service is properly included as an element in building rate schedules, I submit that the gas industry should not only carefully safeguard this prerogative, but should be anxious to further improve and extend its service—rendering it gratuitously but of course as efficiently and as economically as possible.

"As an industry, what a wonderful opportunity we have through adequate, free service to protect our present load, to gain new customers and new business, and at the same time to develop that invaluable asset, customer good-will.

"I have endeavored to show:

1. That good customer-service is vital to the life and growth of the gas industry.
2. That no other group can render this service as efficiently and as economically as the gas company.
3. That not only should gas companies render the very best of reasonable service, gratuitously, but the industry should be extremely careful to protect this prerogative, the cost of which is accepted as an element of operating expense in the determination of rates.
4. That efficient service, both adequate and satisfactory, can be rendered economically, at a very nominal cost considering its promotional value in sales and good-will.

"Believing that the best possible customer-service within reason rendered gratuitously, is one of the most powerful weapons we possess not only in effectively retarding competitors' advances, but in actually promoting the use of gas and developing customer good-will,—I wish to recommend and urge that in every gas company a serious study be made of its customer-service plan, from the standpoint of quality, completeness and cost, to the end that the entire industry may generally render such a high standard of service that other fuels will find it very difficult to displace gas, that new users will be attracted to our product, and that the public in general will recognize the promptness, the completeness and the friendliness of gas company service."

W. J. Donald, Managing Director, American Management Association, delivered an address, "Management and Responsibility." In part he said that, "the rapidity of change under modern economic conditions is making control of business by Government less and less a satisfactory solution of the public's interest in business, and inevitably Governmental control is becoming more and more out of date, cramping and socially uneconomic.

"The way out lies inevitably either in a shift from Governmental control, which at present seems to be increasing, to State ownership and operation, which in America is well nigh unthinkable, or in the much more flexible, readily adjustable procedure by which management will undertake to assume the responsibility of directing business into socially profitable channels in the interests of the public, the consumer and labor, as well as in the interests of capital."

Advice by Insull

"Our Most Important Sales Problem," was delivered extemporaneously by Samuel Insull, Jr., and admonished the gas man not to lose hope. He brought out that the best things were ahead for the gas industry. Backing his statements with figures he went on to show that between 1920 and 1930 the per customer use of electric current decreased 3.5 per cent, whereas in the case of the gas customer there was an increase of 4.7 per cent.

He advised we must make the public "gas minded" and thereby surround gas with an atmosphere of something-to-be-desired, just as the electric men have done.

Mr. Insull touched upon the subjects of househeating by gas, the romance of producing refrigeration by heat, and air conditioning for the home. He stated that it is a wrong idea to hold back on the sale of gas, but rather we should make the people "gas conscious" and push the sale of gas to the utmost in all directions.

Other papers and addresses included "Good Business—What Shall We Do About It?" by Julius H. Barnes, "What Women Expect from the Utilities," by Katherine A. Fisher, "The Twilight of Industry," by W. A. Gilman, "Civics for the Civilized," by John B. Kennedy and "What the Manufacturers Expect from the Gas Companies," by David F. Kahn. This latter paper is presented somewhat fully elsewhere in this issue.

Heating and Ventilating Exposition Features New Equipment

ENTIRELY new equipment and standard products which have been vastly improved were the highlights of the second International Heating and Ventilating Exposition, which was held in Public Hall Annex, Cleveland, from January 25 to 29.

From every standpoint the exposition was highly successful, according to Exposition Manager Charles F. Roth of the International Exposition Co., New York.

Exhibitors reported that sales were far better than had been anticipated, and the attendance was far larger than that at the first exposition two years ago in Philadelphia.

In conjunction with the exposition, the annual meetings of the American Society of Heating & Ventilating Engineers and the American Society of Refrigerating Engineers were held.

The exposition proper performed the service of a clearing house with regard to the latest developments in heating, ventilating and air conditioning practice. Every type of heating, ventilating and air conditioning equipment was shown.

The principal classifications of the persons who attended were heating, ventilating and air conditioning contractors and dealers, plumbing contractors, home owners, public utility representatives, engineers, architects, builders, metal and metal products' representatives, electrical experts and college and university professors.

Many of the visitors commented on the large number of new developments, products of extensive and costly research by the manufacturers who, during the period of slow business, have prepared themselves with new and improved equipment to meet the demand for increased comfort and efficiency which the return of normal business will require.

The trend shown by the exhibits was that heating, ventilating and air conditioning equipment installed in the new buildings of the future will produce greater economics in fuel consumption and will provide more healthful and comfortable atmospheres for residence, business building and factory.

The C. A. Dunham Co. of Chicago featured a new type of concealed radiator. A special point was made of the fact that the heating element may be removed. The Dunham Co. also demonstrated its new temperature regulation system whereby several thermostats, placed at stragetic positions through buildings, provide electrical impulses which are re-correlated to register average room temperatures. A single main steam supply valve is operated by a motor which is actuated by the electrical impulses. The valve automatically sets up a related sequence of adjustments which regulate the pressure, temperature, speed and quality of steam necessary to meet the heat demand.

The American Radiator Co. of New York, placed a great amount of importance to its new "Ideal Cascade" humidifier, a cabinet-type aluminum room unit offered for both steam and hot water heating systems, with automatic action.

The "Mystefier," a small cabinet room humidifier, was shown by the Parks-Cramer Co. of Fitchburg, Mass. It is so small that it may be kept at no in-

convenience on a desk or small table.

A square, warm air type of air conditioner, with the air supply screened through a dry cellular filter, was included in the display of the Henry Furnace & Foundry Co., Cleveland, O.

The Carrier Engineering Corporation, Newark, N. J., showed a new humidifier, cabinet type, where air enters the bottom beneath fin radiation and is sprayed by water, then copper ribbon filtered.

Silica gel gas-fired dehumidifiers for use in residences in conjunction with summer cooling systems attracted a great amount of attention at the booth of the American Gas Association.

A portable pipe beveler was exhibited for the first time by the Air Reduction Sales Co. of New York.

The Peerless Unit Ventilator Ventilation Co. of Bridgeport, Conn., offered a new room ventilator of unusual shallowness. It has a dry air filter.

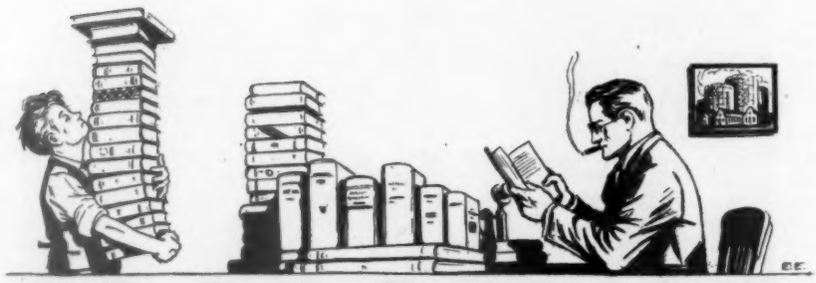
An entirely new steam and hot water heating boiler was exhibited for the first time by the Richardson & Boynton Co., New York. A special feature is a sizeable compartment adjacent to the boiler and where washed clothing may be quickly dried.

A new cabinet type of combined radiator and humidifier was one of the attractions at the booth of the Cooling & Air Conditioning Corporation, New York, which has been recently consolidated with the B. F. Sturtevant Co. of Boston, Mass.

A unit heating and cooling equipment, whereby heating or cooling may be obtained from the same device by a slight adjustment, was the highlight attraction at the booth of the Grinnell Co. of Providence, R. I.

Warren Webster & Co., Camden, N. J., in its exhibit introduced for the first time a new automatic boiler water protector for home and other small building service.

The W. M. Chace Valve Company, Detroit, Mich., showed a complete line of valves. The Barber Gas Burner Company, Cleveland, Ohio, showed a complete line of gas burners for use in industrial plants and in various types of househeating furnaces and boilers. Estate Stove Company, Hamilton, Ohio, exhibited a line of small gas-fired heating units for the home. General Gas Light Company, Kalamazoo, Michigan, had a working exhibit of their unit gas-fired heaters for heating garages, factory buildings, etc. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., exhibited a complete line of heat control devices for use in the home and in industry. L. J. Mueller Furnace Company, Milwaukee, Wis., showed a line of gas-fired hot air furnaces. Patrol Valve Company, Cleveland, Ohio, exhibited their line of gas valves and lighters. Ruud Manufacturing Co., Pittsburgh, Pa., showed a complete line of gas-fired, hot water heaters in various sizes for domestic use as well as factory use. Surface Combustion Corporation, Toledo, Ohio, exhibited a line of gas-fired househeating furnaces and burners for industrial purposes.



BOOK REVIEW

American Gas Practice, Volume I. Production of Manufactured Gas

Published by the author, *Jerome J. Morgan*, 67 Salter Place, Maplewood, New Jersey. 1931. 969 pages. Price $8.

Gas men everywhere are going to welcome with enthusiasm the second edition of Jerome J. Morgan's volume American Gas Practice, in which Volume I deals with the production of manufactured gas. This work, prepared with the aid and advice of an American Gas Association Committee of distinguished engineers, is a first-class well balanced treatise, thoroughly up-to-date in its handling of the subject.

Many gas-company executives will undoubtedly welcome the book more because of the aid which it promises to give their subordinates than because of the personal benefit anticipated. The book was prepared originally as a text to be used by Professor Morgan in teaching the course of study at Columbia University in which a large number of gas-company employees were enrolled. It naturally, therefore, takes on the form of a classroom students' volume. For this very reason it will be of great advantage to the young engineer and also to the many without technical training who within the industry desire to broaden their understanding of the business with which they are connected.

AMERICAN GAS JOURNAL takes pleasure in recommending this worth while volume to its readers. All who buy *and use it* are certain to profit by a better knowledge of the fundamentals of the manufacturing operations of the industry.

The T. A. H. V. E. Guide 1932

The American Society of Heating and Ventilating Engineers Guide 1932 is now available. This, the 10th edition, is dressed in an entirely new binding—a neat, light blue, flexible cover. There are four major sections, namely, the Text Section, the Manufacturers' Catalog Data Section, the Index to Modern Equipment and the Membership Roll of the Society.

The Text Section contains 40 chapters of important data on the design and installation of heating, ventilating and air conditioning systems. Approximately 50% of the subject matter is entirely new, and every chapter has been rewritten and revised. Many subjects not previously treated in The Guide, are included.

The Catalog Data Section has been carefully coordinated with the text, and contains supplementary information on specific materials, equipment and accessories available for heating and ventilating service. In the Catalog Data Section will be found sizes, shapes, capacities, dimensions, space requirements and applications so important to the engineer, architect and contractor in planning, specifying and installing materials and equipment. The two sections are so interlocked that they are practically indispensable to each other, and for the best results it is recommended that the corresponding references in each section be consulted in all cases. The Catalog Data Section is dedicated to the presentation of reliable facts and figures concerning the products shown, eliminating as far as possible unnecessary "sales talk" and comparisons.

956 pages. Single copies $5.00. Obtainable from the American Society of Heating and Ventilating Engineers, 51 Madison Avenue, New York, N. Y.

New Bulletin on Victor Acme Gas Pumps

The Roots-Connersville-Wilbraham Division of International-Stacey Corp., Connersville, Indiana, have just issued bulletin 31-B10 illustrating and describing R-C-W Victor-Acme Gas Pumps. Victor-Acme gas pumps are designed for the handling of clean gas on industrial services, boosting the pressure to the plant itself, or increasing the gas pressure to various departments.

Copies of this bulletin will be sent on request.

Bulletin on Air Filters

Bulletin No. 500-1 has been issued by The Northern Blower Company, Cleveland, Ohio, describing the changes and improvements in "Norblo" Dust Filters. Details of construction are given as well as illustrations showing mechanism.

Copies of this bulletin can be obtained upon request.

EQUIPMENT NEWS

New Gas Refrigerator To Be Placed on The Market This Month

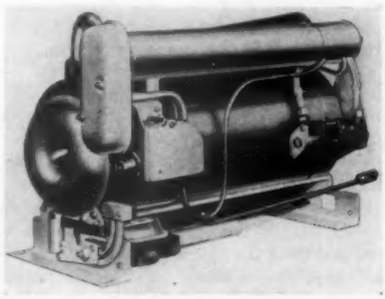
The Faraday Refrigerator Corporation, Dayton, Ohio, a subsidiary of the General Motors Company are placing on the market an absorption type gas-operated household refrigerator to be known as the Faraday. This refrigerator operates on the solid absorption principle, using strontium chloride powder with lithium nitrate as a binder for the absorbent. The refrigerant is liquid ammonia, and a

R. F. Callaway,
Vice-Pres., Faraday Refrigerator Corporation

fluorinated hydrocarbon liquid transfers the heat to and from the absorber. When refrigeration is needed the ammonia vapor is evaporated from the strontium chloride absorbent by heating the absorbent. This causes the ammonia vapor to flow through the condenser. It changes to a liquid and continues to the chilling unit. The absorber is connected by a single tube to the freezing unit in the food compartment.

The absorber unit is very compact and if desirable can be located on a shelf or in the basement at a distance of several feet from the freezing unit. Its placement does not in any way interfere with the operation of the temperature regulator which remains on the cabinet.

A new type of metallic insulation is used which provides enlarged storage space inside the cabinet. The refrigerator is equipped with an adjustable safety burner pilot and with gas filter and gas pressure regulator set to a 2" water pressure. The gas burner and valve, as well as water valve, are easily accessible. It is self-defrosting under ordinary operating conditions. Exterior cabinet finish will be porcelain on steel.



Faraday Absorber Unit

Mr. R. F. Callaway, vice president of Faraday Refrigerator Corporation states that the Faraday refrigerator unit has been developed in the General Motors laboratory over a period of many years. Its operation is based on an entirely new principle which is both efficient and simple. Three household sizes are ready for the market. Their capacities are 4.1 cu. ft, 5.2 cu. ft. and 6.8 cu. ft. The cooling unit will be the same size for all three models. All models have three trays for ice and provide 63 ice cubes or 9 lbs. of ice at one freezing. All are equipped with acid resisting porcelain bottoms.

Mr. Callaway states that distribution of the Faraday refrigerator will be entirely through gas utilities and marketing will be conducted largely in the Eastern and Middle West sections at the start. Mr. H. H. Wampler is assistant sales manager of the company.

The name "Faraday" was selected for the refrigerator, as Michael Faraday, born in 1791, an English chemist, was among the first to make a special study of chlorine. He also made the first rough experiments on the diffusion of gases. In 1847 he discovered the magnetic character of oxygen, and also the magnetic relations of flame and gases. In a paper read April 10, 1823, appearing in the "Philosophical Transactions of the Royal Society of London," under the subhead "Ammonia" he stated.

"In searching after liquid ammonia, it became necessary, though difficult, to find some dry source of that substance; and I at last resorted to a compound of it, which I had occasion to notice some years since with chloride of silver. When dry chloride of silver is put into ammoniacal gas, as dry as it can be made, it absorbs a large quantity of it; 100 grains condensing above 130 cubical inches of the gas; but the compound thus formed is decomposed by a temperature of 100° F. or upwards. A portion of this compound was sealed up in a bent tube and heated in one leg, whilst the other was cooled by ice or water. The compound thus heated under pressure fused at a comparatively low temperature, and boiled up, giving off ammoniacal gas, which condensed at the opposite end into a liquid.

"Liquid ammonia thus obtained was colourless, transparent, and very fluid. Its refractive power surpassed that of any other of the fluids described, and that also of water itself. From the way in which it was obtained, it was evidently as free from water as ammonia in any state could be. When the chloride of silver is allowed to cool, the ammonia immediately returns to it, combining with it, and producing the original compound. During this action a curious combination of effect takes place; as the chloride absorbs the ammonia, heat is produced, the temperature rising up nearly to 100°; whilst a few inches off, at the opposite end of the tube, considerable cold is produced by the evaporation of the fluid. When the whole is retained at the temperature of 60°, the ammonia boils till it is dissipated and re-combined. The pressure of the vapour of ammonia is equal to about 6.5 atmospheres at 50°. Its specific gravity was 0.76."

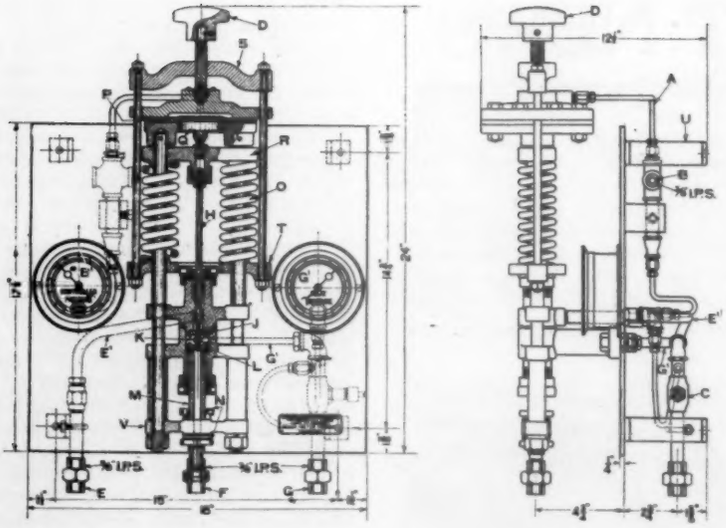
It was the development of his research work that has resulted in the perfection of the gas refrigerator.

Relay Pressure Valve

The Bailey Meter Co., Cleveland, O., announce a new Relay Pressure Valve known as the Style G, which is designed to give extremely accurate pressure control of steam, water or gas lines.

This valve controls the pressure within close limits by regulating the movement of a sylphon operated or piston operated throttle valve installed in the line in which the pressure is to be controlled. A minute change in the controlled pressure will result in a relatively large change in the motive pressure used to operate the regulating valve.

The controlled pressure is connected to point "B" and serves to actuate the diaphragm "P" against the force of springs "O." A motive pressure of air, water or steam at 50 lbs. per square inch or over is connected to line "F." Line "G" connects to the sylphon or piston operated regulating valve and line "E" serves as an exhaust. The pressure which exists in line "G" depends upon the position of the diamond valve "K" between the port "L" through which the motive pressure enters and the seat "J" through which the motive pressure exhausts. Assuming that the pressure "B" increases above that for which the relay valve is set, the diamond valve "K" would be moved closer to the seat "L" by the movement of diaphragm "P." This throttles the flow through seat "L" and at the same time increases the port area through seat "J," with a consequent decrease in pressure in line "G," which would in turn cause the main regu-



lating valve to close slightly and bring the control pressure back to normal.

Handle "D" is used to balance the force of springs "O" against the controlled pressure "B" which is indicated on the pressure gage at the left. The relay pressure is indicated by the pressure gage at the right.

Due to an exclusive feature enabling change of the seat gap by adjustment of micrometer adjuster nuts "M" and "N," it is possible to obtain any desired speed or lag in amplified pressure connection "G." The application of this valve is unlimited as it can operate one valve, a series of valves or pistons.

New Gas Range Finish

The American Stove Co., Cleveland, O., have issued a portfolio featuring a new gas range finish called "Artyle." This new finish is a tile pattern and soft color blending of storm-gray and old ivory which will harmonize with any kitchen interior regardless of its color scheme, or whether it has tile, painted or paper walls. A number of color reproductions of Magic Chef series of ranges are shown.

A distinctive feature of Magic Chef ranges is their "Three-in-One" non-clog burner. This burner gives any flame desired—simmering, medium or hot fast fire. It is not necessary to move utensils from one burner to another when change of flame is desired. The burner heads are die cast from aluminum alloy, which will not clog or corrode from rust. They are quickly removable for easy cleaning.

Non-Corrosive Burner Heads

New Safety Oven Shelves

A new type of safety oven shelf for gas ranges has been recently placed on the market by the Union Steel Products Company, Albion, Michigan.

Under the weight of hot pans and baking dishes, this type of shelf may be easily pulled out of the oven to a convenient working level for inspection and replacement without danger of burning the fingers or scorching pot holders. The special design of the shelf wires provides a safety catch to prevent the shelves from being pulled out too far.

A special handle is provided for each set of shelves which facilitates pulling out and replacing loaded shelves.

All parts of the shelves, and supports

are heavily cadmium plated, and are easily wiped clean with a damp cloth.

Standard size shelves and supports, in complete sets ready for installation are now available for regular size ovens. Each set includes two shelves, one broiler shelf (with broiler pan and rack) and all necessary side runners, screws and handle.

C-E VM Type Boiler

Combustion Engineering Corporation, 200 Madison Ave., New York, has just issued a catalog describing the C-E VM Type Boiler. The boiler described is of the bent-tube type and is by design especially adapted to plants having limited space conditions and particularly where the head room is low.

This boiler is available in sizes ranging from 1215 sq. ft. to 5328 sq. ft. of heating surface. It is adaptable to practically any type of firing and may be set double.

The features of the C-E VM Type Boiler are: Large boiler drums; both upper drums have large steam liberating surface; a system of "filter baffles" which stagger the flow of gases around the tubes, thereby promoting heat transfer with but little effect on the draft loss, which is notably low. 8 pages, 8½ x 11.

New Bulletins on McKee Products

Eclipse Fuel Engineering Co., Rockford, Ill., have just published Bulletin A-5, which shows their complete line of McKee Feed Water Devices not requiring a motor operated pump; Bulletin A-13 showing their new McKee Automatic Gas Fired Low Pressure Welded Steel Boiler and Bulletin A-14 listing new reduced prices on McKee Series "E" Automatic Gas Controllers.

NEWS *of the* GAS INDUSTRY

Pinchot Proposes Plan for Utility Control

The following eleven points are proposed as a program for public-utility regulation by Governor Gifford Pinchot, of Pennsylvania. These proposals were made by the Governor at a meeting in mid-January of representatives of municipalities and other political sub-divisions of his State gathered to discuss rates and regulations of utilities. The Governor did not include in this list of eleven points the proposal that he be given authority to remove the present Public Service Commission and create in its place a new Fair Rate Board. His proposals were:

1. Prohibit the issuance of utility stocks until the Commission has approved them.
2. Require the establishment of an excess earnings reserve by utilities.
3. Permit districts to condemn and operate public utilities.
4. Limit the life of utility charters to 50 years.
5. Give the Public Service Commission jurisdiction over holding companies and affiliated subsidiaries.
6. Prohibit new schedules of rates from becoming effective until after the Commission has given its approval.
7. Permit the payment of reparations by classes instead of individual cases.
8. Eliminate the "ready to serve" charge.
9. Make utilities to pay for replacements out of reserves.
10. Extension of rural electric lines as cheap rates.
11. Eliminate the requirement that the Public Service Commission pass on contracts entered into between utilities and municipalities.

Consumers' Gas Company of Toronto Has Gross Revenue of Eight Million Dollars

At the close of the company's fiscal year, on Sept. 30, 1931, its total assets amounted to $24,883,602.64, and its gross revenue for the year amounted to nearly $8,000,000.

The capital stock of the company outstanding on Sept. 30 last was $13,250,000, of par value $100 per share. This capital is owned by 3,045 shareholders, the average holdings per shareholder being 43 shares. The satisfactory market record of the company's shares, together with an uninterrupted dividend record of eighty-three years, makes the shares of the Consumers' Gas Company a favored investment, especially with people of moderate means. The high regard in which the shares of the company are held by investors generally is indicated in the fact that during a period in which the market prices of most industrial stocks were receding, the price of the company's shares was fully maintained. The simplicity of the financial structure of the Consumers' Gas Company has been a contributing factor to this record, the capital being all common stock, with no preferred stock, bonds or other senior securities ranking ahead of it.

The stock ownership is almost wholly Canadian in character, more than 94 per cent of the company's shares being owned in Canada. Over 75 per cent of the total is owned by people resident in the territory served by the company.

The maximum dividend rate permitted by the company's act of incorporation is 10 per cent on the par value of the capital stock. Owing to the high premium received from the sale of the company's capital shares, and to the investment of the premium as well as the capital in plant and equipment, the company need earn only slightly more than 5 per cent on its total assets, in order to pay 10 per cent dividend on the par value of its capital stock outstanding.

The sale of gas appliances in 1931 resulted in a revenue to the company of nearly $400,000.

To Use Former Oil Line

The Kansas Pipe Line & Gas Company is going ahead with the reconditioning operations on a portion of the Stanolind Co.'s oil carrier, which line the company has leased from a point in Keith County, Nebraska, to Freeman, Missouri. Gas will be put into the line through a connection with the existing 16-inch line at the Kansas-Nebraska border in Republic County, Kansas. The company has secured franchises to serve the towns of Narka, Mahaska, Hoyt, Perry, Haddam City, Greenleaf, Morrowville, Barnes, Wheaton, Westmoreland, Emmett, Delia, Lecompton, Linn, Clebourne and Blaine with natural gas.

Longest Pipeline Bridge In World for Sioux Falls

The longest bridge of its kind in the world is being constructed across the Missouri River by the Northern Gas & Pipeline Company to carry the natural gas pipeline to Sioux Falls, South Dakota.

The crossing is west of Sioux City, Iowa, near Ponca, Nebraska.

The bridge will be of the suspension type with a clear span of 1,280 feet. The pipeline will be 75 feet above the water.

Construction is in charge of the Lone Star Gas Company, one of the pioneers in the use of pipeline bridges. The bridge is scheduled for completion early this spring. A temporary line now crosses the Missouri River to give service to Sioux Falls until the permanent bridge is finished.

Michigan Utilities Report on Sales of Gas for 1931

Michigan gas utilities supplied approximately 33,530,000,000 cubic feet of manufactured gas to the homes and industries of the state in 1931, according to an estimate released recently by the Michigan Utilities Information Bureau based upon company reports to the American Gas Association.

Sales, while behind those of 1930, 1929, and 1928, were well ahead of those for 1927 or any previous year. They were more than double the sales for 1921, which aggregated 16,391,683,000 cubic feet. The 1931 sales were 7.2 per cent below those of 1930, but only 2.3 per cent below those of 1928, which at that time was regarded as a banner year.

Approximately 76 per cent of the state's output of manufactured gas was used for domestic purposes ranging from refrigeration to house heating. The remaining 24 per cent was used in commercial or industrial operations.

It is significant of the steady advancement of the adaptation of gas to diversified manufacturing processes involving the use of heat that the number of industrial and commercial customers in Michigan increased 33 per cent during the year. There was, of course, a decrease in the volume of gas going to manufacturing concerns for heat treating, enamel baking, metal melting, and the like due to the general sag in business.

The number of house heating customers increased 6.4 per cent. There was a decrease in the number of domestic customers resulting from population shifts because of economic conditions. The total number of customers at the end of the year was in excess of 670,000, which is below the records of the industry's three high years, 1930, 1929, and 1928, but well above all other years.

Gas was taken to 21 additional towns in 1931, bringing the number of Michigan communities with gas service up to 284.

Natural gas again entered the gas picture in Michigan in 1931. Late in August, Consumers Power company began to supply Midland with natural gas from the Broomfield township field west of Mt. Pleasant. At the same time, the Gas Corporation of Michigan began to supply Mt. Pleasant, Clare and Rosebush with natural gas from the Vernon township field northeast of Mt. Pleasant.

The new year opens with the extent of the Mt. Pleasant natural gas area and the measure of its hidden stores still undetermined. Findings within the coming months are expected to indicate whether sufficient supplies and reserves are available to warrant expansion of service.

Wants Gas Franchise

The Eastern Colorado Gas Company, represented by Ray W. Howbert, offers to construct a natural gas pipe line from the fields in which the Indian Territory Illuminating Oil Company is drilling wells, in eastern Colorado, to Brush, Colorado, and serve the city of Brush with natural gas provided it be given a twenty-five year franchise. The pipe line would cost about $1,000,000.

NEWS of the GAS INDUSTRY

Michigan Utilities Announce Construction Plans

Michigan's electric power and gas utilities are planning to spend upwards of $17,500,000 on new construction during the coming year, according to a compilation of budget estimates made by the Utilities Information Bureau.

The electric power companies propose to spend approximately $15,250,000 of this total, and the gas companies approximately $2,250,000. These estimates are to take care of improvements and expansions immediately necessary. The amounts appropriated to construction may be considerably increased as business conditions become better or if situations arise demanding greatly enlarged electric power or gas supplies.

During the past two years both the electric and gas utilities have gone ahead with their construction programs looking toward the providing of facilities to take care of the normal growth in the use of electricity and gas. In most parts of the state, as a result, the production and transmission facilities are well up to or ahead of the anticipated demand for the next year or two. While some of the new construction in prospect for 1932 is designed to provide additional capacities, most of its aims toward providing greater efficiency in generating plants, in delivery equipment, and in service to customers.

Construction expenditures of Michigan gas and electric utilities in 1931 aggregated close to $26,800,000. The electric utilities spent approximately $23,360,000 of this amount and the gas utilities spent $3,440,000.

Major gas construction operations in 1931 included the building of 270 miles of high pressure lines for long distance transmission of gas, the construction of a large mileage of local mains, and the building of a new gas plant at Marquette.

Over Twelve Million In Budgets

The boards of directors of Public Service Corporation of New Jersey and its operating companies have approved budgets for 1932 totaling upwards of $12,250,000.

Including amounts to be expended on projects initiated prior to January 1, 1932, total expenditures for construction by Public Service Electric and Gas Company during 1932 will amount to more than $17,500,000, of which approximately $15,000,000 will be spent by the electric department and $2,500,000 by the gas department.

In the gas department, improvements and extensions will be made to both manufacturing and distribution facilities.

The Atlantic City Gas Company, Peoples Gas Company and County Gas Company, subsidiary operating companies of Public Service Corporation of New Jersey, will expend approximately $750,000 for new construction during 1932.

Large Pipeline Now Bringing Natural Gas

The 26-inch pipe line crossing the State of Kansas from Mullinsville to Clifton was put into operation last month and is now bringing natural gas to towns in Nebraska, Iowa, South Dakota and Minnesota.

The 26-inch line is one of the two largest in the country, a similar line being constructed in California.

In spite of the extraordinary size of the new line, construction was finished ahead of schedule. The crews laid as high as three miles of pipe a day, establishing a record for such heavy construction.

Plan Gas Service

Under the terms of a twenty-five year franchise, the Illinois Northern Utilities Company will supply gas service in Amboy, Illinois.

Amboy customers will be supplied with natural gas from a group of wells located about nine miles south of Amboy.

Construction of the distribution mains will be retarded by winter weather conditions, but the Company is prepared to work on the project whenever conditions will permit. It is very likely that the system will be in operation by late spring.

Lines Under Construction

Minnesota Northern Natural Gas Company has seven miles of branch line under construction to serve Dodge Center, Kasson, New Richland and Wells in southern Minnesota. Service will commence soon.

Jefferson, Iowa, will also receive natural gas shortly.

Extends Services

The Kansas Pipe Line & Gas Company will build the distribution systems and serve the towns of Macksville, Belpre, Seward, Claflin, Bushton, Holyrood, Beverly, Tescott, Delphos, and Miltonville from the new 26-inch line now being built by the Missouri Valley Pipe Line Company between Mullinsville and Clifton. Franchises are being secured and preliminary surveys have been made in each town.

Convention Calendar

February

16-17 A.G.A. Mid-West Sales Conference, Sherman Hotel, Chicago, Ill.
18 Manufacturers' Section, American Gas Association, Palmer House, Chicago, Ill.
25-26 Eastern Natural Gas Regional Sales Conference, William Penn Hotel, Pittsburgh, Pa.

March

8-9 Oklahoma Utilities Association, Tulsa, Oklahoma.
30 New Jersey Gas Association, Newark, N. J. Herbert E. Cliff, secretary.

April

8 Maryland Utilities Association, annual convention, Lord Baltimore Hotel, Baltimore, Md. D. E. Kinnear, secretary.
6-8 A.G.A. Distribution Conference, Tutweiler Hotel, Birmingham, Ala.
11-13 Mid-West Gas Association, St. Paul, Minn.
13-15 Arizona Utilities Assn., Tucson, Ariz.
28-30 Missouri Association of Public Utilities, Excelsior Springs, Mo. F. D. Beardslee, secretary.

May

3-5 Southern Gas Association, New Orleans, La.
9-11 Natural Gas Convention, Tulsa, Oklahoma.

June

9-10 Canadian Gas Association, Winnipeg, Manitoba, Fort Gary Hotel. G. W. Allen, secretary.

July

5-7 Michigan Gas Association, annual convention, Mackinac Island, Mich. Albert G. Schroeder, secretary-treasurer.

August

23-26 Pacific Coast Gas Association, Davenport Hotel, Spokane, Wash.

October

10-14 American Gas Association, Atlantic City, N. J.

The Company is also constructing natural gas distribution systems at Rossville and Silver Lake, recently having completed a system at Valley Fall. Company gas is now being served to Morrowville, Kan.

Canadian Natural Gas

Production in Canada of natural gas during the first ten months of 1931 was approximately 21.2 billion cubic feet. The output in the corresponding period of the preceding year as reported by the Canadian official Bureau of Statistics was 23.3 billion.

House of Representatives Orders Utility Study

An investigation into public-utility holding companies, particularly with reference to their ownership, was ordered by the House of Representatives in a vote on January 19. The Committee on Interstate and Foreign Commerce of the House is instructed to determine the ownership and control, both direct and indirect, of the stock or securities of any public-utility corporation other than a common carrier by railroad.

The purpose of the House in ordering this inquiry is to determine whether further legislation is needed to remedy any situation with reference to the handling of local utility affairs by holding-company owners. Apparently the first action is to be taken with reference to the large gas and electric holding companies. It is not known to what extent the House will utilize the earlier investigations bearing on this subject already made by the Federal Trade Commission. It is evident, however, that the representatives of certain utility enterprises will seek to have the House merely review the Commission's findings rather than to repeat in full the inquiries previously made.

Brooklyn Union Appliance Sales for 1931 Highest in History of Company

Public demand for efficient and economic equipment is indicated by the increase in appliance sales during the 12 months of 1931 over the previous year, according to Hugh H. Cuthrell, Manager of the New Business Department, Brooklyn Union Gas Co., Brooklyn, N. Y.

In announcing the net new appliance sales for 1931, Mr. Cuthrell stated that the use of gas in the home is constantly developing and increasing, as is exemplified by the advance in sales of refrigerators and house-heating equipment.

The net new appliance sales for 1931 totaled $2,486,241, the largest in the company's history. The net new sales for the month of December totaled $128,134. Of this amount $85,438.21 worth of appliances represented sales by branches.

U. G. I. Companies to Spend More Than $28,000,000 in 1932

Utility subsidiaries of The United Gas Improvement Company will spend more than $28,000,000 in 1932 for additions and improvements to plant equipment, President John E. Zimmermann announced recently. This money, Mr. Zimmermann said, largely will be spent for the extension of gas and electric service in the territories supplied by the various companies.

The principal companies and the approximate amounts they will spend follow:

Allentown-Bethlehem Gas Company, $126,500; Chester County Light & Power Company, $118,500; Commonwealth Utilities System, $879,000; Concord Gas Company, $18,000; Connecticut Electric Service Company and subsidiaries, $3,400,000; Consumers Gas Company, $365,200; Delaware Electric Power Company and subsidiaries, $1,377,000; Erie County Electric Company, $112,000; Harrisburg Gas Company, $177,600; Lebanon Valley Gas Company, $28,700; Luzerne County Gas & Electric Corporation, $474,700; Manchester Gas Company, $50,300; Nashville Gas & Heating Company, $314,700; New Haven Gas Light Company, $256,400; Northern Liberties Gas Company, $3,150; Philadelphia Electric Company, including amounts carried over on uncompleted 1931 projects, $20,520,000.

Utilities Forbidden To Sell Accessories

Ending a practice prevalent in Texas for the past twenty-five years, Judge Chas. A. Wheeler, presiding over the 53rd district court, granted to the State of Texas an injunction which restrains the San Antonio Public Service Company of San Antonio, Texas, from selling gas and electric appliances at retail in conjunction with their operations in selling heat and power to the public. Judge Wheeler, on January 20th, ruled that this is an ultra vires act of the corporation.

This is one of the most important decisions affecting public utilities and gas distributing companies which has been rendered in several years. Practically every corporation in this class in Texas has maintained a retail sales room where appliances for the use of their products were offered for sale. Many of them maintained large sales forces and used extensive advertising designed to bring the public to their sales rooms. Extensive merchandising plans, which included large scale financing of installment payments, were in vogue.

The San Antonio company, however, had gone further than this. They had operated sight-seeing busses and made loans to their local Chamber of Commerce and purchased railroad bonds. Their attorneys argued that all of this had been done to foster the business of the corporation, and this was the crux of the case.

Assistant Attorney General E. L. Looney who handled this case for Attorney General Allred, presented a striking illustration which, apparently, was the deciding factor in the case. He argued that appliance companies, to increase their sales, might engage in the production and sale of natural gas; this was a direct reversal of the argument of the defendant company.

At the time the case was decided, public utility corporations operating in the State of Texas had millions of dollars tied up in stocks of accessories which they had purchased to be retailed through their organization. The decision was acclaimed by hardware dealers and plumbing companies who have experienced considerable difficulty in meeting the competition offered by the utility sales divisions.

The defendant company announced that it will appeal at once, and there is every reason to believe that the case will be carried to the highest courts. Judge Wheeler made it clear that his decision rested entirely upon the evidence before him, although he took judicial notice of the fact that the sale of appliances, to some degree, has been the practice in Texas for a quarter of a century.

In the judgment the San Antonio Public Service Company was enjoined from engaging further in the sale of appliances, and also from operating sightseeing busses. The company was upheld in three loans, made to the San Antonio Chamber of Commerce, although the court expressed doubt as to the wisdom of two of them. Other loans, made to the South Texas Ice Company, subsidiary to the American Light and Traction Company which also owns stock in the defendant corporation, were ultra vires acts. Judge Wheeler refused to revoke the charter of the defendant, or to impose any fine.

New Towns Added

Distribution systems have been completed in Narka, Emmett, Westmoreland, Scandia, Delphos and Onaga recently and these communities are now receiving natural gas service from The Kansas Pipe Line and Gas Company.

Grant Increase in Rates for 1000 B.t.u. Gas

Acting on an emergency request by the Northern Indiana Public Service Company, an Insull company, the Indiana public service commission has granted an increase in cubic feet rates for 1,000 b.t.u. gas to be consumed by patrons in Michigan City, Valparaiso and the South Bend districts. The increase was approximately 64 per cent more than the former cubic foot rate for 570 b.t.u. gas. The company formerly charged $1.65 net for each 1,000 cubic feet of 570 b.t.u. gas and now will charge $2.71 for gas testing 1,000 b.t.u. per cubic foot. The change was made because of the introduction of natural gas to the system and the fact that the public service commission some time before had placed itself on record as opposed emphatically to charging for gas on the therm basis. The company had been using the therm basis of computation since the introduction of natural gas.

Answer to Starbuck Rebus:—

"Do not let down on your advertising."

Personals

John B. McEwan, who for over fourteen years has conducted the activities of manufacturers' organizations, has been retained by the Underground Pipe Protection Institute to conduct its activities. Mr. McEwan has had no previous connection with the industry or its affiliated industries.

Several years ago the Bureau of Standards and the Corrosion Committee of the American Petroleum Institute advanced the thought that it would be more advantageous to communicate with an organization of manufacturers of protective coating than with the same manufacturers as individuals. To this end, the Underground Pipe Protection Institute was organized.

Up to the present time the Institute has functioned as the medium for exchange of information between the American Petroleum Institute, the American Gas Association, and the Bureau of Standards; also Institute members. The Institute also prepared a tentative code for visual inspection of coatings and submitted the same to the Bureau of Standards for further action by the several organizations mentioned above.

After feeling its way for the last year or so, the Institute believes it is now in a position to be of more substantial assistance to its members and to the trade as well.

A Co-ordinating Committee and Technical Committee have been appointed and are now functioning.

A campaign is now being conducted to increase both the active and associate memberships.

Mr. McEwan's address is 30 North LaSalle St., Chicago, Ill.

Earl J. Good, formerly division sales supervisor for the Public Service Company of Indiana, has been appointed district manager for the company with offices at Lebanon, Ind. Mr. Good has been with the company at Lafayette, Ind., since 1920, first as an assistant engineer and later as engineer. In 1922 he was transferred to the sales department. He graduated from Purdue University in 1917. He succeeds C. E. Adams as district manager.

Flora G. Dowler has been placed in charge of Home Service activities for the Virginia Gas Distributing Corporation, with headquarters at Clifton Forge, Va.

Harold W. Johnston, who has been the superintendent of the Jackson County Light, Heat, and Power Co. at Independence, Mo., has been made the district manager of the Ozark Distributing Company at Warrensburg, Mo. Mr. Johnston will make his headquarters in Warrensburg and will supervise company activities in Concordia, Sweet Springs, La Monte, Knob Noster, Emma, Alma and Blackburn, all of which are operated from the Warrensburg office.

William M. Martin has been appointed manager of the Capitol Division of New York Power and Light Corporation, Albany, N. Y., it was announced recently. Mr. Martin has been genereal superintendent of the Division, which includes the Albany, Troy and Hudson districts, since March 15, 1930.

Mr. Martin came with New York Power and Light on June 1st, 1928, as assistant superintendent of power plant operations. Just prior to that time he had been connected for four years with the Monongahela-West Penn Public Service Company, first as general district superintendent of that company's properties in West Virginia and Maryland, and later as manager of the Parkersburg-Marietta division with headquarters at Parkersburg, West Virginia.

Previous to this, he was with the West Penn Power Company for three years as division manager of its West Virginia and Maryland properties.

In his new position, Mr. Martin succeeds J. G. Menut, who has resigned.

G. F. Heustis, since 1927 manager of the Glens Falls Division of New York Power and Light Corporation, has been transferred to the general office at Albany where he will assume duties in connection with industrial development activities previously handled by C. A. Davis, formerly a vice president of New York Power and Light.

The management of the Glens Falls Division will be assumed by Thomas W. Drought, resident manager at Schenectady. For the present, Mr. Drought will continue his duties at Schenectady. Both changes became effective early in January.

In addition to supervising the company's operations throughout the extensve area included in the Glens Falls Division, Mr. Heustis has been active in civic enterprises in Glens Falls. He has served on the executive committee of the Glens Falls Outing Club for several seasons and has also been president of the Club. He was recently re-elected president of the local Chamber of Commerce.

Mr. Heustis came with the Adirondack Power and Light Corporation in 1924 as distribution engineer at Glens Falls. In 1926 he was made distribution superintendent, and was promoted to resident manager at Glens Falls in the spring of 1927. In the fall of that year, he was appointed division manager.

Mr. Drought, who succeeds Mr. Heustis, entered the utility business 23 years ago with the Broadalbin Electric Light and Power Company and, for several years prior to the time that Company was acquired by the Fulton County Gas and Electric Company, as its vice president and general manager. He continued in charge of operations in the Broadalbin area until 1927 when he was made commercial manager of the Mohawk Division, New York Power and Light Corporation. In December, 1929, he was transferred to the general office at Albany as rate engineer, and in July, 1930, was appointed manager of the Schenectady district.

John J. Beisiegel, who, on January 16th, was appointed Assistant to President Frank R. Barnitz, of the Central Union and Northern Union Gas Companies, and General Manager of the Companies' Bronx, N. Y. offices and properties, was elected a Director of The Bronx Board of Trade at the January meeting of the Directorate, to fill the vacancy caused by the recent death of Mr. Arthur H. Hall.

Mr. Beisiegel, on January 16th, also celebrated the fortieth anniversary of his association with the gas companies. In his new post, he has taken over the duties of the late Mr. Hall, who was his superior for more than thirty-eight years.

K. M. Irwin, was appointed assistant to the Vice-President in charge of mechanical engineering of the Philadelphia Electric Co. Mr. Irwin had been mechanical engineer of the U. G. I. Company since January, 1927.

Fred Fulghum has succeeded Harold W. Johnston as superintendent of the Jackson County Light, Heat and Power Co., at Independence, Mo.

Joseph F. McCarron has been appointed agent of the Public Service Gas & Electric Corp., at Plainfield, N. J., succeeding William R. Causbrook, who was transferred to the general office at Newark.

Sir H. Montagu Allan, for many years a member of the board of directors of Montreal Light, Heat & Power Consolidated, resigned at the usual monthly monthly meeting of that body held in January. Sir Charles Gordon, president of the Bank of Montreal, was appointed to fill the vacancy thus created.

John C. Mellett, Indianapolis author and former newspaperman, has been appointed publicity and advertising manager of the Indiana group of utilities which are subsidiaries of the Midland United Company.

E. Frank Gardiner, who has been in this position, as well as publicity director of the Midland United, will continue to serve the subsidiary companies in an advisory and supervisory capacity, but will devote most of his time to the affairs of the holding company.

George W. Brinkley has been made manager of the Oklahoma Natural Gas Corporation's office in El Reno.

R. H. Lussky, formerly gas and electric engineer of the Oklahoma Corporation Commission, has been appointed manager of the Oklahoma properties of the Oklahoma Public Service Corporation.

(Personals continued on page 66)

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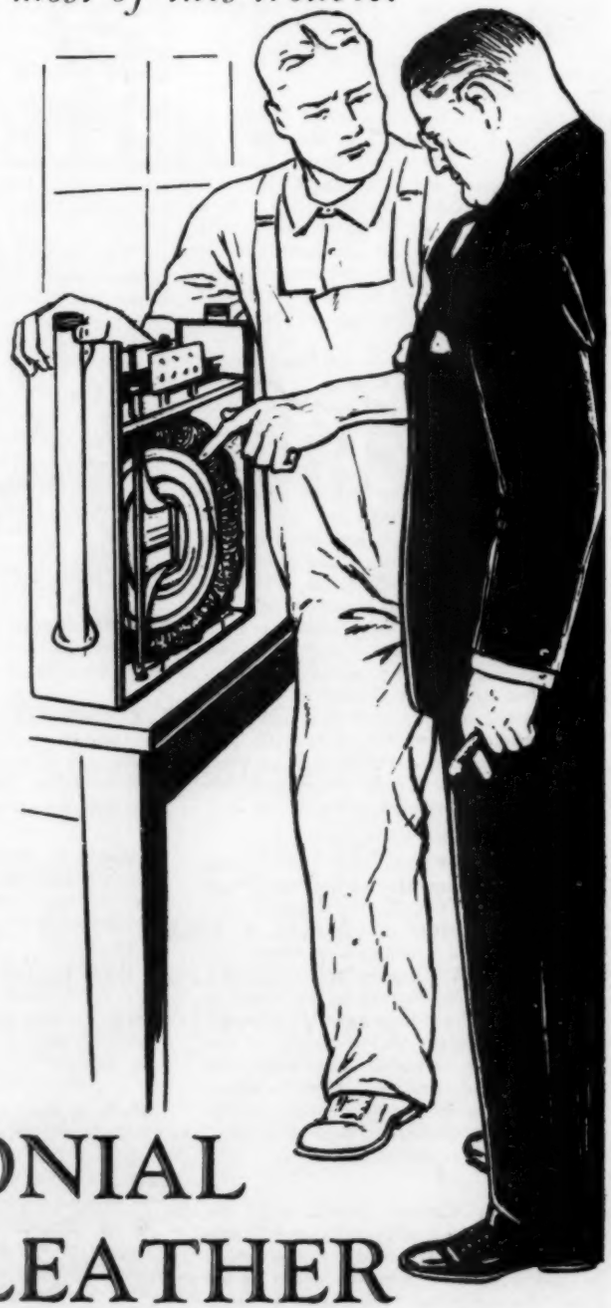

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Addison W. Lee has been elected vice president in charge of operation, of the Louisville Gas and Electric company, succeeding the late Lewis S. Streng. Mr. Lee has been general superintendent of the company.

E. D. Wood, who has been general electric operating engineer, succeeds Mr. Lee as general superintendent.

J. J. McKenna, vice president and treasurer, was appointed to the executive committee of both the Louisville Gas and Electric Company of Delaware and the Louisville Gas and Electric Company of Kentucky, to fill the vacancy caused by the death of Mr. Streng. Robert Montgomery, vice president in charge of sales, was elected to fill the vacancy on the board of directors of the Delaware corporation and Mr. Lee was elected to fill the vacancy on the board of directors of the Kentucky corporation.

Mr. Lee will observe his twenty-fifth anniversary with the Louisville Gas and Electric Company on March 7, 1932. He graduated in 1906 with a B.S. in E.E. degree from Rose Polytechnic Institute and became associated with the Louisville company in 1907 as construction inspector; in 1914 he was made head of the inspection and drafting department and later was appointed assistant general superintendent. In 1926 he was made general superintendent.

Mr. Lee has been very active in aviation circles in Louisville and Kentucky and was chairman of a special committee appointed by former Governor Sampson to draft the present state aviation laws; he is chairman of the Louisville and Jefferson County Air Board, a member of the Board of Trade Aviation Committee, and a licensed pilot.

M. B. Fowler has been elected vice president and treasurer of the San Diego Gas & Electric Co., L. M. Klauber, vice president in charge of operation, A. E. Holloway, vice president in charge of sales, and J. A. Cannon, secretary. Mr. Cannon also was elected to the board of directors of the company. Mr. Fowler has been secretary and treasurer of the company, Mr. Klauber has been vice president and general superintendent, Mr. Holloway has been manager of the commercial department, and Mr. Cannon has been assistant secretary.

Willis H. Carrier, president of the American Society of Heating and Ventilating Engineers received the first award of the F. Paul Anderson gold medal, "for distinguished scientific achievements in the field of heating, ventilating and air conditioning," at the 38th Annual Banquet of the Society held in Cleveland, January 28th. The presentation was made for the Committee of Award by L. A. Harding, Buffalo, New York, Past President of the Society.

"Willis H. Carrier," said Mr. Harding, "is recognized as the father of the science of modern air conditioning, resulting from his mathematical investigations and experimental and development work."

Mr. Carrier's exhaustive study of psychrometric phenomena resulted in the development of fundamental principles which have constituted the foundation upon which the modern science of air conditioning is built. Industry was the first to recognize the value of air conditioning to increase production, eliminate manufacturing difficulties and improve quality of product so that 200 distinctly different applications have been made from rayon to railroads. Later, air conditioning for comfort was recognized and applied to theatres, department stores, office buildings and public places of assembly, including the Capitol of the United States at Washington, D. C.

"Mr. Carrier," said Mr. Harding, "has more recently turned his attention to the home and has created a house heating and conditioning unit to filter, heat, humidify and cool the air for the occupants."

Mr. Carrier is Chairman of the Board of the Carrier Corporation, Newark, New Jersey; Director, Carrier Engineering Company, Ltd., of London; a member of the American Society Mechanical Engineers; Past President, American Society of Refrigerating Engineers. President, American Society of Heating and Ventilating Engineers.

G. P. Sheppard has been appointed manager of the Anderson Gas & Utilities Company, Anderson, S. C.

P. Black has been appointed manager of the Washington Gas & Electric Company, Everett, Wash. Mr. Black was formerly associated with the Seattle Gas Company, Seattle, Wash.

Joseph A. Staples, Jr., has been appointed assistant secretary and treasurer of the Oklahoma and Kansas properties of the Empire Public Service Company.

C. A. Leland was recently elected President of The Kansas Power & Light Company and the Kansas Pipe Line & Gas Company.

D. E. Ackers was elected Vice President of The Kansas Power & Light Company and as general manager will have operating charge of the properties.

B. A. Hagan has been named sales manager of the Illinois Power & Light Company, Decatur, Ill., taking the place of M. S. Bandoli, who resigned. Mr. Hagan has been with the company for the past six years as commercial and gas engineer.

George McFadden has been appointed salesmanager for the Mansfield District of the Ohio Fuel Gas Company.

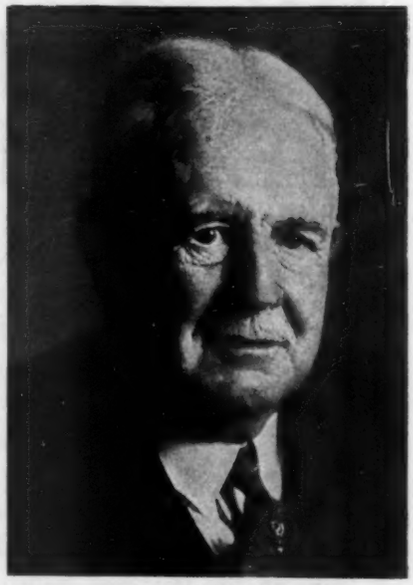
F. C. Foy was recently appointed assistant general manager of the Seattle Gas Co., Seattle, Wash., in charge of advertising, employee training and customer contacts.

Paul S. Clapp was recently elected Vice-President of the Columbia Gas & Electric Corporation, with headquarters at New York. Mr. Clapp was formerly managing director of the National Electric Light Association.

Obituary

A. J. STACEY

Andrew J. Stacey, 73 years old, Vice President and Director of the Stacey Bros. Gas Construction Company and Director of the Stacey Manufacturing Company, subsidiaries of the International-Stacey Corporation, died January 18th at his home, 1120 Wyoming Avenue, Wyoming, Ohio, a suburb of Cincinnati.



Andrew J. Stacey

Mr. Stacey was Vice President of the firm founded by his father and had been with the Stacey companies since his youth. He was recognized throughout the world as an authority on work identified with the machinery and gasholders used in connection with the manufacture and distribution of manufactured and natural gas. The Stacey companies were organized in 1851.

In addition to his interest in the gas utility industry, Mr. Stacey was a director of the First National Bank, Elmwood Place, Ohio. He was a member of the Queen City Club and the Wyoming Country Club.

Surviving Mr. Stacey are his widow, Mrs. Josie P. Stacey, a stepson, Paul C. Rodgers, Glendale, Salesmanager of the Gasholder Division of the International-Stacey Corporation and son-in-law J. G. Carruthers, Vice President of the Otis Steel Company, Cleveland.

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TRADE NEWS

United Engineers & Constructors, Inc.—Activities

A contract has been awarded by The Brooklyn Union Gas Company, of Brooklyn, N. Y. for the installation of piping and equipment to handle refinery oil gas in the works, and for the use of the U. G. I. Reforming Process, for reforming refinery oil gas upon six existing carburetted water gas sets at the Greenpoint works of this Company.

The equipment will consist generally of high pressure holders, meter, regulators, hot scrubbers, naphthalene scrubbers, oil gas lines and connections, and also the necessary changes to the water gas sets, so that the U. G. I. Reforming Process can be used. The apparatus will be designed to handle in excess of 4,000,000 cu. ft. of oil refinery gas per day.

The installation will be similar in design to the Chester, Penna., plant, where refinery oil gas was used in this way for the first time. By means of the U. G. I. Reforming Process, refinery oil gas of a specific gravity of 1.0 and a heating value of about 1600 B. t. u. per cu. ft. is converted into a gas of lower gravity and heating value suitable for distribution in place of carburetted water gas or as a mixture with coal gas.

Pacific Meter Works Expands Sales Service

Announcement has been made by American Meter Company that effective on January 1st, 1932, the Pacific Meter Works assumed sales and service on the Pacific Coast of Westcott Orifice Meters, Gages and other Control Devices manufactured by the Metric Metal Works factory of American Meter Company. These products were formerly handled on the Coast by Westcott & Greis, Incorporated, who are sales agents for Metric Metal Works and other manufacturers in the Mid-Continent Field. The new arrangement on the Pacific Coast has been consummated with the assistance and cooperation of the Westcott & Greis organization.

A complete stock of parts and instruments will be carried by the factories of the Pacific Meter Works located at 2118 Atlantic Street, Los Angeles and at 495 Eleventh Street, San Francisco. The same warehouse and sales facilities will also be rendered on other gas and oil industry products formerly handled on the Coast by Westcott & Greis as agents for Crosby Steam Gauge & Valve Co., Taylor Instrument Co., The Meriam Co. and the Robinson Orifice Fitting Company. The assumption of these agencies gives the Pacific Meter Works a complete line of devices for the measurement and control of gas, oil and water in the Pacific Coast territory.

Sales and service in Southern California will be under the personal supervision of Mr. Kenneth C. Tomlinson, Assistant Manager of Pacific Meter Works. His headquarters will be at the Los Angeles factory.

Lukenweld, Inc. Appoints Two Representatives

Lukenweld, Inc., (division of Lukens Steel Company of Coatesville, Pa.), which is engaged in the design and manufacture of parts for machinery and equipment by gas-cutting, press-forming and arc welding of rolled steel, has appointed two new representatives to handle the sales and service of its products.

In the state of Wisconsin, Lukenweld, Inc., is now represented by Welding Engineering Company, 2872 North 41st Street, Milwaukee. This concern is headed by Mr. A. H. Friese, who for many years has been engaged in engineering and sales work in connection with welding and welding apparatus.

In the Buffalo, N. Y., territory (including Erie county, Pa., and New York from the western boundry to Utica), Lukenweld, Inc. is represented by Marvine Gorham, Jackson Building, Buffalo. Mr. Gorham is a graduate of Massachusetts Institute of Technology in Mechanical Engineering, and has had many years of experience in the metal-working industries, particularly in the sale and service of castings, pressed steel, forgings and stampings.

J. D. Harrison Reappointed Chicago District Manager for Combustion Engineering Co.

Combustion Engineering Corporation, New York, announces that J. D. Harrison, district manager of the Chicago office from 1922 to 1929, has been reappointed to that position with offices in Bankers Building, Adams and Clark Streets, Chicago.

Mr. Harrison will succeed Mr. Hugh R. Carr, who has been transferred to the Sales Department of the home office at New York as Manager of Stoker Sales.

Earnings of Servel, Inc.

Servel, Inc., and subsidiaries report for year ended October 31, 1931, net profit of $1,067,397 after interest, depreciation, federal taxes, etc., equivalent after allowing for dividend requirements on 8,389 shares of 7 per cent preferred stock outstanding at end of period, to 58 cents a share on 1,736,426 no-par shares of common stock. In preceding year company reported for ten months ended October 31, 1930, net profit of $559,603 after interest, depreciation, taxes and costs of introducing new models, etc., equal to 29 cents a share on 1,729,850 shares of common stock. The fiscal year has been changed to end October 31 instead of December 31.

Current assets, including $3,654,729 cash, were $6,718,302 and current liabilities were $753,464, on October 31, last, comparing with $6,492,864 and $776,505, respectively, on October 31, 1930.

Directors declared an initial dividend of $7 on the preferred stock for the year 1932, beginning February 1. The dividend is payable quarterly.

Servel, Inc., preferred dividends for year 1932 are payable February 1, May 2, August 1 and November to stock of record January 20, April 20, July 20 and October 20, respectively.

Charles McDonough Appointed Publicity Manager of Combustion Engineering Co.

Combustion Engineering Corporation announces the appointment of Charles McDonough as Publicity Manager succeeding Carl Stripe, who has resigned to publish a new monthly magazine to be known as Steam Plant Engineering. Mr. McDonough has been identified with the Company for the past fifteen years, having served as Assistant Publicity Manager for some time prior to his present appointment. Mr. Stripe has also had a long identification with the company, in which he has served in the capacities of field engineer, sales engineer, district sales manager, and for the past five years as publicity manager.

George H. Bucher Elected Vice President and General Manager, Westinghouse Electric International Company

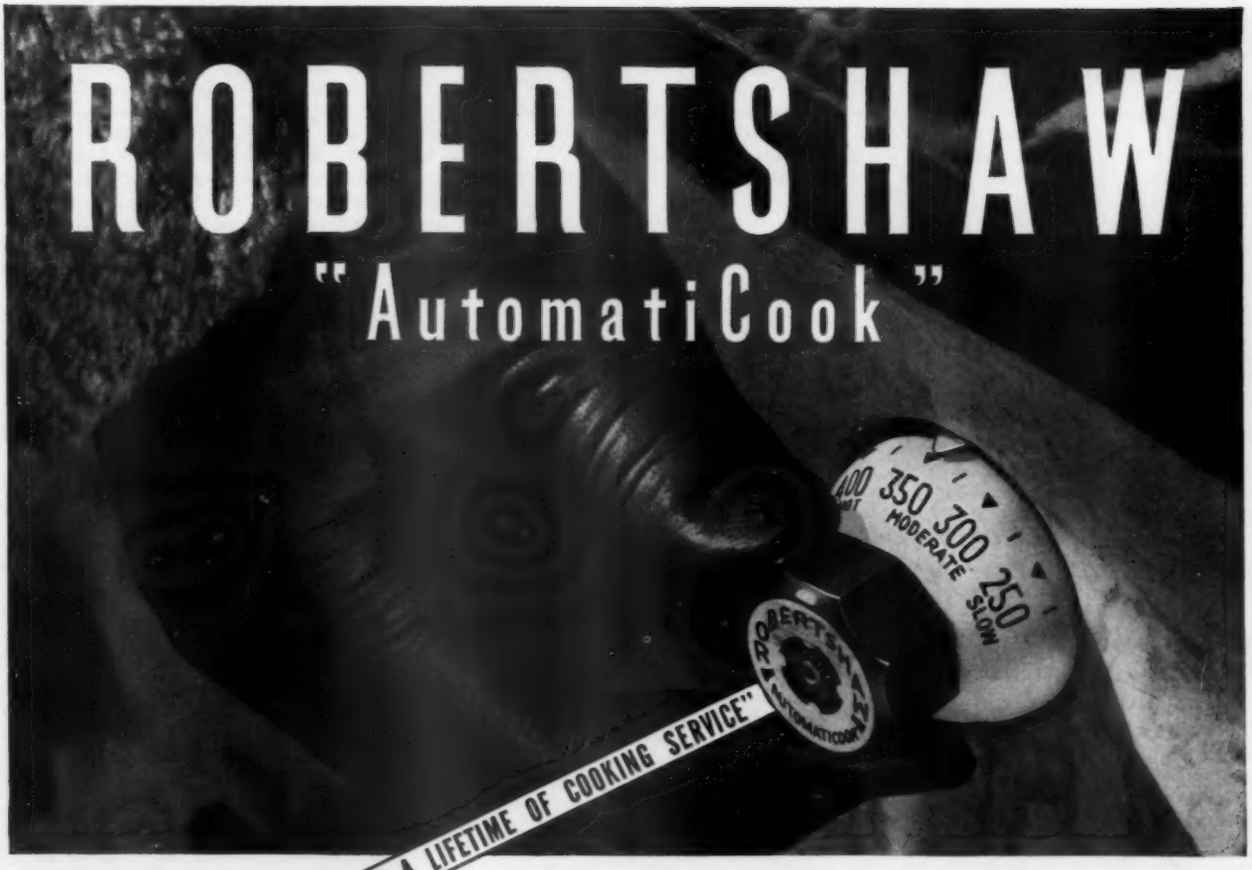
At a meeting of the Board of Directors of the Westinghouse Electric International Company held in New York, recently, George H. Bucher was elected vice president and general manager.

Mr. Bucher joined the Westinghouse organization September 1, 1908, as a graduate student. He graduated from the Pratt Institute in Brooklyn in both steam and machine design and electrical engineering. He was transferred from the graduate student course at East Pittsburgh to the export department in New York, January 20, 1911. April 1, 1920, he was appointed assistant to general manager of the Westinghouse Electric International Company. July 1, of the following year, he was appointed assistant general manager, which position he held until his recent appointment.

He is a member of the A. I. E. E. and vice president of the New York chapter of the Westinghouse Veterans' Employees' Association.

He will make his headquarters at 150 Broadway, New York, N. Y.

(*Trade News continued on page 70*)



NEW MODEL "F" FOR TABLE TOP AND CONSOLE RANGES

MODEL "K" FOR CONSOLE RANGES

This New Robertshaw means

EXTRA SALES FOR YOU

● The Robertshaw contribution to the gas range industry has been an exceptional combination of engineering skill and aggressive merchandising.

● As soon as the new table top ranges appeared, Robertshaw designed a new AutomatiCook to meet their special requirements.

● And it is a real AutomatiCook in every way, fully comparable to the long known Model "K". Note its handy, yet inconspicuous location. It's as easy to set as a radio dial.

● Both the new Model "F" and the famous Model "K" render the last word in precise, accurate, trouble-free oven control. Complete details of this new Robertshaw, for either table top or console ranges, should be on your desk today. Write for them now.

ROBERTSHAW THERMOSTAT CO.

YOUNGWOOD · · PA.

W. J. Reeder Appointed Manager of St. Louis Branch Office of Bailey Meter Co.

Bailey Meter Company, 1050 Ivanhoe Road, Cleveland, Ohio, announce the appointment of Mr. W. J. Reeder as manager of its St. Louis Branch Office. This appointment fills the vacancy made by the untimely death of Mr. C. J. Prendergast, which resulted from injuries received in a building collapse at Paoli, Indiana, a short time ago.

For the past seven years, Mr. Reeder has been connected with the Chicago Branch Office of the Bailey Meter Company, where he has had a wide experience in the solution of metering, controlling and regulating problems.

Mr. Reeder will be assisted by Mr. J. R. Buss, who has been located in the St. Louis district for the past four years. Their headquarters will be at 127 Waterman Building, 457 North Kingshighway—Telephone Delmar 4770.

Bryant Heater & Mfg. Co. Hold Sales Conferences

The annual Sales Conferences of The Bryant Heater & Mfg. Company, Cleveland, Ohio, were held during the weeks of January 11th and 18th.

Instead of the entire Sales Organization meeting in Cleveland in a general convention as has been the custom in the past, regional meetings were held in Philadelphia, Cleveland and Chicago.

Informal round-table discussions featured the meetings with periods devoted to consideration of product, market and sales policies and practices. A continuation of the Company's national advertising and sales help program was announced.

Representatives and field men from each of Bryant's forty-eight branch offices attended the meetings. In view of the exceptionally satisfactory volume of business produced in 1931 the outlook for the ensuing year is most encouraging.

New Leaflet Describes Fulton Dash Pot

The Chaplin-Fulton Mfg. Co., Pittsburgh, Pa., have issued folder No. 2903 describing and illustrating The Fulton Dash Pot or Sensitizer. The Dash Pot is used where, owing to unusual conditions, the ordinary or single diaphragm regulator does not control the delivery pressure with sufficient exactness. The folder contains a table showing the usual size Dash Pot furnished with various size regulators, together with weight distribution for each.

A copy of this leaflet can be obtained upon request.

General Electric Orders in 1931

Orders received by the General Electric Company during the year 1931 amounted to $252,021,496, compared with $341,820,312 for 1930, a decrease of 26 per cent, President Gerard Swope has announced.

Orders for the quarter ended December 31 amounted to $49,321,480, compared with $74,168,480 for the last quarter of 1930, a decrease of 34 per cent.

Sales billed and earnings for the year 1931 are not yet available, but the complete annual report will be forthcoming in March.

Arthur A. Johnson Corp. Purchase McRae Paint Products, Inc., and McEverlast, Inc.

Mr. Arthur A. Johnson, President of the Arthur A. Johnson Corp., announces the purchase of the assets and goodwill of McRae Paint Products, Inc., and McEverlast, Inc., manufacturing and selling units engaged in the distribution of the Hunt Process of curing concrete and McEverlast Pipe Line Coatings. Mr. Johnson states that a new corporation will be formed which will combine the activities of the old companies, continuing the business on a basis of national and international distribution. Mr. G. R. March formerly vice-president and eastern manager of McEverlast, Inc., will be associated with Mr. Johnson. The names of the officers of the Johnson-March Corporation will be announced in the near future.

Westinghouse General Sales Conference

A four day general sales conference was held at headquarters of the Westinghouse Electric and Manufacturing Company, in East Pittsburgh recently. Headquarters executives, district sales managers, subsidiary company officials and works managers attended this conference.

Markets, policies, engineering developments and research progress were among the subjects discussed during the meeting. New and improved electrical products, for the home and industry, were discussed by the engineering managers.

The conference was held under the direction of J. S. Tritle, Vice President and General Manager. Included among the speakers were President F. A. Merrick, Vice Presidents S. M. Kintner, W. S. Rugg, Walter Cary and Harold Smith, and J. M. Hipple, General Works Manager.

H. S. Sleicher Now with General Refractories Co.

Mr. Harry S. Sleicher, formerly Vice President of the North American Refractories Company, has severed his connection with that Company and is now associated with the General Refractories Company in a sales capacity, with headquarters in the New York office of the General Refractories Company.

Electrolux Activities

The Consumers Gas Company of Toronto has just mailed circulars announcing a group plan of purchasing gas appliances offered to customers at very attractive prices and terms. Under this plan, the appliances are placed in six different groups or combinations allowing quantity prices on all items.

In Group One are offered an Electrolux refrigerator, Smoothtop range, Autohot water heater, and Lamneck clothes dryer. A savings of over $100 is offered the customer on the group, besides a small down payment and 42 months to clear the balance.

Group Two consists of an EA-3 Electrolux, Regent range, and Autohot water heater. Here a saving of $40 is available with 36 monthly payments. In Group Three an EA-4 Electrolux, Smoothtop range, and Autohot water heater are included at a $64 saving and 39 months to pay. Group Four contains a large model Electrolux, Magic Chef range, and Autohot water heater at an attractive reduction of $96 with 42 monthly payments. Groups Five and Six consist of smaller gas appliances.

Prices quoted are for complete installation if there is gas service in the home and no carrying charges are added to the cost.

Electrolux salesmen for the Minneapolis Gas Light Company have recently undertaken a novel plan of securing the names of refrigerator prospects. The salesman takes the addresses of all homes displaying "ice cards" in the windows, consults the city directory to get the names, and sends these people the Electrolux Plan "C" broadside with a savings analysis form made out for the average family. Then he telephones for an evening appointment.

A survey of the results indicate that about 50 per cent of these names are good prospects. Of the 50 per cent, about half are immediate potential prospects and the balance should be ready to buy in the spring.

Recognizing the fact that many potential Electrolux customers may be found among gas users, the Consolidated Gas Company of New York is now placing "Island Displays" along the path to catch their interest. Ray M. Martin, Director of Display, has created a small but compact unit for the sales floor that cleverly intrigues everyone on the many features of gas refrigeration.

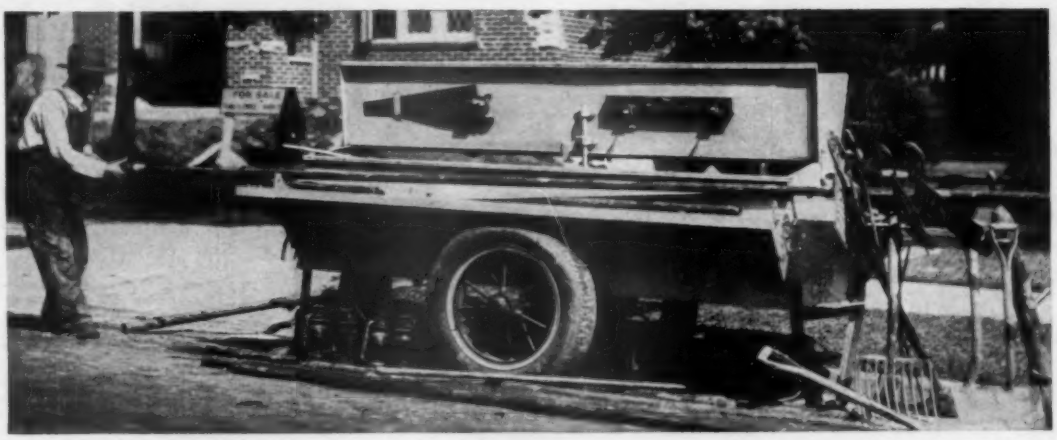
These "Island Displays" usually consist of a small circular platform erected in the center of the floor near the doorway. On one side is shown a stripped unit, while on the opposite half is a complete refrigerator, both of which are connected for operation. The advertising message is essentially brief, but generally a floor salesman hovers nearby ready to offer his services should the prospect show more than casual interest.

According to Mr. Martin, the idea is proving immensely popular and virtually pays its own way in the many sales and leads that are uncovered daily.

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs

SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.



No truck tied up on this Job!

This gas installation crew hitch their HanDeeBox to a truck. The truck takes them to the job. The HanDeeBox is unhitched, and the truck goes on.

The foreman gets out his HanDeeBox key and unlocks the *one* lock that fastens both covers *(and they are fastened the full length of each side)*; the covers are raised and there are all of the necessary tools and fittings—with each one in its proper place!

The HanDeeBox has an arrangement of compartments and shelves to take care of the most complicated collection of tools and equipment. It is of All-Steel construction—much stronger than a wooden box, but lighter in weight.

Write for Bulletin No. G-6 which gives a complete description of the HanDeeBox and other Littleford Equipment for Gas Companies. You will be under no obligation.

LITTLEFORD BROS.
424 East Pearl Street, Cincinnati, Ohio

for MIXING Gases

there's the

CF

Differential Regulator

Use No. 1—To maintain a constant pressure ratio (differential) between manufactured and natural gas.

Use No. 2—To maintain a constant rate of flow, or line pressure.

Use No. 3—To check the flow of, and prevent the escape of, large volumes of gas when breaks occur in line or holder.

In any of these three services, this regulator gives the same efficient results that the gas world expects from all *C-F* products for gas regulation.

A free bulletin explains the special applications and abilities of the *C-F* Differential Regulator for Mixing Gases.

THE CHAPLIN-FULTON MFG. CO.

28-40 PENN AVE. PITTSBURGH, PA.

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Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 80.

PLANT EQUIPMENT

"AMERICAN" GAS AND METER TESTING APPARATUS
American Meter Co. 320

AUTOMATIC GOVERNORS
Connelly Iron Sponge & Governor Co. 289

BALANCE GOVERNORS
Connelly Iron Sponge & Governor Co. 290

BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co. 295

B. H. CO. OSCILLATING CONTINUOUS FILTER
The Bartlett Hayward Co. 701

B. H. CO. THICKENER
The Bartlett Hayward Co. 56

B. H. CO. VERTICAL SCRUBBER
The Bartlett Hayward Co. 57

BLAST GATE
Western Gas Construction Co. 580

BOILER FEED PUMPS
P. M. Lattner Mfg. Co. 478

"BULLETS"—HOLDERS
Stacey Bros. Gas Constrn. Co. 560

BUTTERFLY VALVES
Western Gas Construction Co. 450

BUTANE PLANT EQUIPMENT
Philgas Co. 510

BUTANE GAS PLANT CONTROL
Cutler Hammer, Inc. 631

CALORIMETRY
American Meter Co. 321

CALOROPTIC, THE
Connelly Iron Sponge & Governor Co. 511

CHEMICAL ANALYSIS OF GAS PURIFYING MATERIALS
E. J. Lavino & Co. 455

CHEMISTRY AND PHYSICS OF THE COMBUSTION OF GASEOUS FUELS
E. J. Lavino & Co. 456

CONNELLY COMBINATION VALVE
Connelly Iron Sponge & Governor Co. 610

CONTROL MECHANICAL APPARATUS
Western Gas Construction Co. 581

COOPER-BESSEMER NEW TYPE COMPRESSOR UNIT
Cooper-Bessemer Co. 517

COOPER-BESSEMER VERTICAL GAS ENGINES
Cooper-Bessemer Co. 518

COOPER-BESSEMER GAS AND OIL ENGINES
Cooper-Bessemer Co. 519

COOPER COMPRESSOR UNIT
Cooper-Bessemer Co. 520

CORRUGATED TRANSITE
Johns-Manville 601

COUNTER BALANCE MANHOLES
Connelly Iron Sponge & Governor Co. 299

DECOMPOSITION METERS
Western Gas Construction Co. 582

DEHYDRATION OF MANUFACTURED GAS
Western Gas Construction Co. 583

DISTRICT L. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 293

DR. OTT-LUX-GAS TESTER
The Alpha Lux Co., Inc. 23

DUPLEX VALVES
Andale Co. 45

FAST S FLEXIBLE COUPLING
The Bartlett Hayward Co. 54

FORGED STEEL GATE VALVES
Darling Valve & Mfg. Co. 20

FULTON DEAD WEIGHT SAFETY VALVES
Chaplin-Fulton Mfg. Co. 480

FULTON LEVER SAFETY VALVES
Chaplin-Fulton Mfg. Co. 479

GAS CONDENSERS
Isbell Porter Co. 140

GAS COOLER
Andale Co. 46

GAS DISTRIBUTION
The U. G. I. Contracting Co. 652

GAS ENGINE DRIVEN COMPRESSOR UNITS
Cooper-Bessemer Corpn. 503

GAS FILTERS
American Meter Co. 322

GAS PURIFICATION PROCESS
Western Gas Construction Co. 585

GAS HOLDERS—HIGH AND LOW PRESSURE
Stacey Mfg. Co. 579

GAS MEASUREMENT
American Meter Co. 323

GATE VALVES
Western Gas Construction Co. 586

GAS WORKS APPARATUS AND EQUIPMENT
Connelly Iron Sponge & Governor Co. 627

HAND COLORIMETER
The Alpha Lux Co., Inc. 22

HIGH EFFICIENCY GAS CONDENSERS
Isbell Porter Co. 137

HIGH PRESSURE TOWER
Western Gas Construction Co. 587

HOWARD CHARGER
The Western Gas Construction Co. 37

HIGH TEST WELDING ROD
Union Carbide & Carbon Corpn. 255

HIGH PRESSURE GAS HOLDERS
Western Gas Construction Co. 590

JET PHOTOMETERS
Connelly Iron Sponge & Governor Co. 298

JOHNS-MANVILLE SERVICE TO THE POWER PLANT
Johns-Manville 602

KEEPING UP WITH INDUSTRY
Cruse Kemper Co. 457

KENNEDY AUTOMATIC CONTROL
The Bartlett Hayward Co. 55

LABORATORY APPARATUS
American Meter Co. 324
Superior Meter Co. 521

LIQUID PURIFICATION
The Western Gas Construction Co. 85

LUX RECORDING GAUGE
The Alpha Lux Co., Inc. 21

MACKENZIE EXHAUSTERS
Isbell Porter Co. 653

MANUAL OF DRY BOX PURIFICATION
E. J. Lavino and Co. 276

MERCURY SEAL GOVERNORS
Connelly Iron Sponge & Governor Co. 291

METERS, GAS
American Meter Co. 326
Superior Meter Co. 522
Roots-Connersville-Wilbraham —
International-Stacey Corpn. 702

"METRIC" IRONCASE METERS
American Meter Co. 325

NAPHTHALENE ABSORPTION PLANTS
The Western Gas Construction Co. 84

NEW AND IMPROVED COOPER GAS ENGINE COMPRESSOR
Cooper Bessemer Corpn. 523

OBSERVATION ON LUX-MATERIAL
The Alpha Lux Co., Inc. 24

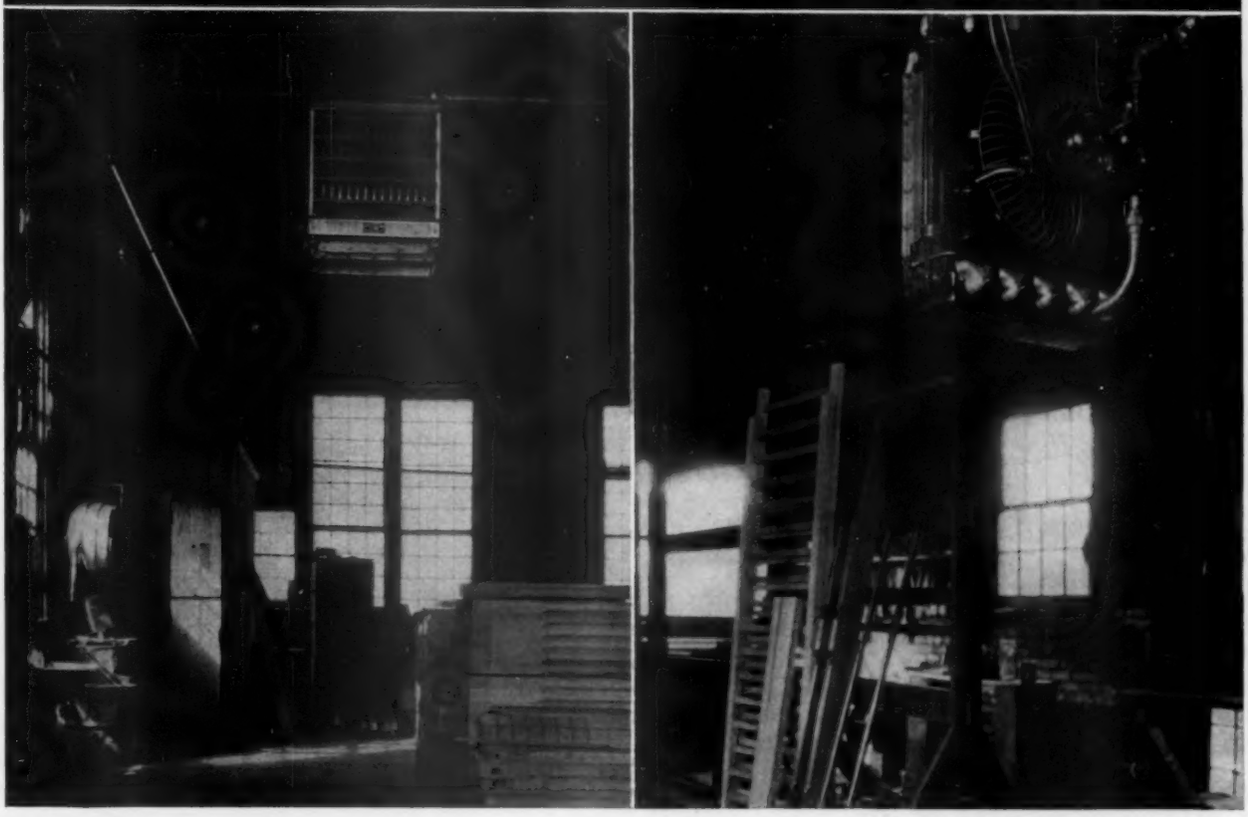
ORIFICE METERS
American Meter Co. 327

PRESSURE GAUGES
Connelly Iron Sponge & Governor Co. 296
American Meter Co. 378
Superior Meter Co. 525

PRESSURE VACUUM RELIEF VALVE FOR STORAGE TANKS
International-Stacey Corpn. 642

PURIFICATION OF NATURAL GAS & REFINERY GASES FROM HYDROGEN SULPHIDE
Western Gas Construction Co. 588

HUMPHREY GAS UNIT HEATERS



Heat PLUS
with Humphrey Gas Unit Heaters

WHEN Humphrey Gas Unit Heaters were installed in the Woodings-Verona Tool Works, Oakmont, Pittsburgh, Penna., their full usefulness wasn't realized. Economical, automatic heat was what the owners desired—but they got more than this.

In the paint shop (left) gasoline paint is sprayed almost continuously on railroad track gauges, track levels, and other products. They soon found Humphrey fan action hastened the drying process, so now the units are operated the year around without gas during summer months, half with gas during spring and fall, and all units supplying heated as well as fan-driven air, during winter.

Humphrey Gas Unit Heaters work equally well in the pattern shop (right) where quantities of fine dried lumber are used in making tool models. The management reports excellent service.

Here again are demonstrated more practical installations and uses for Humphrey Gas Unit Heaters and they should give you ideas for furthering the sale of these dependable heaters AND GREATER GAS SALES in your community. Write for complete information about Humhprey Gas Unit Heaters.

General Gas Light Company
Kalamazoo, Michigan

44 West Broadway
NEW YORK

A HUMPHREY PRODUCT

135 Bluxome Street
SAN FRANCISCO

LEADING GAS COMPANIES USE LAMBERT METERS

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
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LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

there's sales value in saying—

"This gas furnace is
AUTOMATICALLY CONTROLLED
not simply semi-automatically"

STAT-AMATIC

(Designed particularly for gas fired furnaces)

Stat-Amatic has many exclusive features. Each one will strengthen your Gas Furnace Sales.

You can boost your sales and give your customers greater convenience by using Stat-Amatic. Others have. Why not you?

DON'T DELAY. SEND THIS COUPON TODAY.

Stat-Amatic Instrument & Appliance Company
Hartford, Conn. GJ. 5

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TRADE CATALOGS

RELIANCE SERVICE REGULATORS
Isbell Porter Co. 139

ROADLESS BARROWS
Isbell Porter Co. 655

ROTARY SELF-CLEANING STRAINER
Audale Co. 656

SECTIONAL SIDE-WALL CONSTRUCTION
International-Stacey Corpn. 643

SERVICE CLEANERS
American Meter Co. 657
Superior Meter Co. 521

SERVICE GOVERNORS
Connelly Iron Sponge & Governor Co. 658

SERVICE D. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 294

SHAVING SCRUBBERS
Isbell Porter Co. 138

SPECIFICATIONS ON HIGH AND LOW PRESSURE HOLDERS
The Stacey Bros. Gas Constrn. Co. 74

"STACEY BULLET"
The Stacey Bros. Gas Constrn. Co. 73

STACEY-KLONNE DRY GAS HOLDERS
Stacey Bros. Constrn. Co. 644

STANDARD HOLDERS FOR LOW PRESSURE STORAGE
Western Gas Construction Co. 580

STANDARD STEEL BUILDINGS
International-Stacey Corpn. 645

STEEL DERRICKS AND ACCESSORIES
International-Stacey Corpn. 646

STREET DEPARTMENT TOOLS
Connelly Iron Sponge & Governor Co. 297

STREET MAIN GOVERNORS
Isbell Porter Co. 134

THROTTLE GOVERNORS & COMPENSATORS
Isbell Porter Co. 662

U. G. I. BARRING DOWN MACHINE, THE
The U. G. I. Contracting Co. 663

U. G. I. INTERMITTENT CHAMBER OVENS
The U. G. I. Contracting Co. 75

U. G. I. MECHANICAL GENERATOR AND CHARGER, THE
The U. G. I. Contracting Co. 79

U. G. I. MODEL "B" AUTOMATIC CONTROL, THE
The U. G. I. Contracting Co. 78

VALVES
The Western Gas Construction Co. 86

VALVES & SPECIALS
Isbell Porter Co. 144

VALVES
Darling Valve & Mfg. Co. 35

VERTICAL GAS ENGINES
Cooper-Bessemer Corpn. 504

WATER GAS
The Western Gas Construction Co. 89

WATERLESS GAS HOLDERS
The Bartlett Hayward Co. 58

WEST GAS
West Gas Improvement Co. 175

PUMPS FOR GAS PLANTS
Geo. D. Roper Corpn. 481

R-C-W STANDARD DUTY GAS PUMPS
Roots-Connersville-Wilbraham 636

ROTARY DISPLACEMENT METERS
Roots-Connersville-Wilbraham 59

R-C-W HEAVY DUTY GAS PUMPS
Roots-Connersville-Wilbraham 647

STANDARD HOLDERS FOR LOW PRESSURE STORAGE
Stacey Mfg. Co. 424

HIGH PRESSURE GAS HOLDERS
Stacey Mfg. Co. 425

INSTRUMENTS

BRISTOL'S AIR OPERATED CONTROLLERS
The Bristol Co. 122

BRISTOL'S AUTOMATIC ELECTRIC CONTROL VALVES
The Bristol Co. 126

BROWN AUTOMATIC TEMPERATURE CONTROL CATALOG
The Brown Instrument Co. 166

BROWN ELECTRIC FLOW METER CATALOG
The Brown Instrument Co. 170

BROWN REMOTE TYPE INSTRUMENTS
Brown Instrument Co. 427

BRISTOL AUTOMATIC TEMPERATURE CONTROL CATALOG ON GAS FIRED BAKING OVEN
Bristol Co. 498

BRISTOL'S LONG DISTANCE TRANSMITTING GAUGES
The Bristol Co. 129

BRISTOL'S PYROMETERS
The Bristol Co. 130

BROWN PYROMETER CATALOG
The Brown Instrument Co. 171

BRISTOL'S PYROMETER CONTROLLERS
The Bristol Co. 123

BRISTOL'S RECORDING BAROMETERS
The Bristol Co. 125

BRISTOL'S RECORDING LIQUID LEVEL GAUGES
The Bristol Co. 128

BRISTOL'S RECORDING MILLIVOLTMETERS FOR ELECTROLYSIS SURVEYS
The Bristol Co. 664

BRISTOL'S RECORDING PRESSURE & VACUUM GAUGES
The Bristol Company 132

BRISTOL RECORDING PSYCHROMETERS
The Bristol Co. 308

BRISTOL'S TEMPERATURE CONTROLLERS
The Bristol Co. 124

BRISTOL'S RECORDING THERMOMETERS
The Bristol Company 665

THE ERA OF AUTOMATIC CONTROL
Brown Instrument Co. 502

"GOOD FURNACES—GOOD MEN—YET WE'RE SUNK ON OUR HEAT TREATING COSTS"
Brown Instrument Co. 550

MEETING YOUR IDEAS ON THE FLOW PROBLEM
The Brown Instrument Co. 164

PARTLOW TEMPERATURE CONTROLS
Partlow Corpn. 482

PRESSURE GAUGE CATALOG
The Brown Instrument Co. 169

RECORDING DEMAND FOR GAS METERS
American Meter Co. 330

RECORDING THERMOMETERS CATALOG
The Brown Instrument Co. 168

RESISTANCE THERMOMETERS CATALOG
The Brown Instrument Co. 167

TYCOS INSTRUMENTS FOR GAS PLANTS
Taylor Instrument Companies 542

REGULATORS

AUTOMATIC GAS BURNING EQUIPMENT
Partlow Corpn. 470

AUTOMATIC TEMPERATURE CONTROLS
Partlow Corpn. 471

AUTOMATIC TEMPERATURE INDICATING CONTACTOR
Partlow Corpn. 472

AUTOMATIC TRUCK-CLOSING ANTI-VACUUM VALVE
Reynolds Gas Regulator Co. 282

BARBER SUPERIOR GAS PRESSURE REGULATORS
The Barber Gas Burner Co. 604

BOTTLED GAS AN ALLY OF THE GAS INDUSTRY
Sprague Meter Co. 306

FULTON GAS FUEL BOILER GOVERNOR
The Chaplin Fulton Mfg. Co. 248

FULTON GAS REGULATOR CATALOGUE
The Chaplin Fulton Mfg. Co. 247

HIGH PRESSURE LINE REGULATORS AND HIGH PRESSURE RELIEF VALVES
Reynolds Gas Regulator Co. 278

HIGH PRESSURE SERVICE REGULATORS
Reynolds Gas Regulator Co. 279

HOUSE SERVICE REGULATORS
Groble Gas Regulator Co. 703

LINOTYPE AND MONOTYPE TEMPERATURE CONTROL
Partlow Corpn. 473

(Continued on page 76)

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THE RANGE BURNER

Modernizes the Kitchen Range

The Johnson Range Burner is designed for installation in conventional kitchen coal ranges. Thousands of homes in communities served by gas still harbor these ranges. Coal ranges are a traditional combination of heating plant, cook stove and water heater. Now they can be converted to burn gas—and still retain their original features. Thousands of people will welcome this opportunity to change to gas and still keep their old range. The Range Burner is a Hit! Get on the Band Wagon—write for details.

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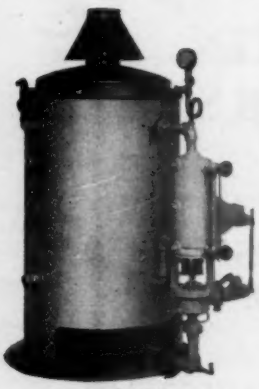

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TRADE CATALOGS

(Continued from page 74)

LITTLE GIANT HOUSE REGULATOR
Reynolds Gas Regulator Co. 283

LOW PRESSURE SERVICE REGULATORS
Reynolds Gas Regulator Co. 281

METAL MELTING POT TEMPERATURE CONTROL CIRCULAR
Partlow Corpn. 474

METER HANGER CATALOG
Mueller Co. 2

PERFORMANCE IS PROOF
Groble Gas Regulator Co. 175

POCKET HAND BOOK—DIRECTIONS FOR SETTING AND OPERATING FULTON GAS REGULATORS
The Chaplin Fulton Mfg. Co. 249

REGULATOR CATALOG
Mueller Co. 3

REGULATOR CATALOG
Reynolds Gas Regulator Co. 37

REGULATORS FOR HIGH & MEDIUM PRESSURES
Sprague Meter Co. 225

RELIANCE BALANCE VALVE DISTRICT REGULATOR
Isbell Potter Co. 135

SINGLE DISTRICT & DOUBLE DISTRICT REGULATORS
Isbell Porter Co. 666
Reynolds Gas Regulator Co. 280

SAFETY GAS VALVE AND PILOT WITH LOW WATER SHUT OFF
Partlow Corpn. 475

SINGLE- DOUBLE- AND QUADRUPLET SAFETY GAS VALVE AND PILOT
Partlow Corpn. 476

FULTON HOUSE REGULATOR
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FULTON DIFFERENTIAL GAS RELIEF VALVES
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FULTON LOW PRESSURE REGULATORS
FULTON CUTOUT LATCH REGULATOR
FULTON DEAD WEIGHT REGULATOR
FULTON DUPLEX SENSITIVE GAS GOVERNOR
The Chaplin Fulton Mfg. Co. 611

REFRACTORIES

CEMENTING JAMP JOINTS
Quigley Company 159

CHOOSING A HIGH TEMPERATURE CEMENT

HIGH TEMPERATURE CEMENT IN THE GAS PLANT
Quigley Company 158

HOT PATCHING RETORTS
Quigley Company 160

HYTEMPITE IN THE GAS PLANT
Quigley Company 163

HYTEMPITE IN THE POWER PLANT
Quigley Company 408

PROTECT YOUR PLANT & EQUIPMENT —A PROTECTIVE COATING
Quigley Company 161

PROPERTIES AND USES OF KROMEPATCH
E. J. Lavino & Co. 458

QUICK CARBURETOR REPAIRS MADE HYTEMPITE
Quigley Company 157

QUIGLEY REFRACTORY GUN, THE
Quigley Company 162

QUIGLEY ACID PROOF CEMENT
Quigley Company 310

PIPE

AUTOGENOUS WELDING OF NATIONAL PIPE
National Tube Co. 411

BELL & SPIGOT REPAIR CLAMPS
S. R. Dresser Mfg. Co. 612

CAST IRON PIPE & FITTINGS
McWane Cast Iron Pipe Co. 203

COUPLINGS AND SPECIALTIES FOR NATURAL GAS
S. R. Dresser Mfg. Co. 43

COUPLINGS FOR MANUFACTURED GAS MAINS
S. R. Dresser Mfg. Co. 42

COUPLINGS FOR PLAIN END PIPE
S. R. Dresser Mfg. Co. 613

WESTLING VALVE
The Bartlett Hayward Co. 275

WOODALL-DUCKHAM VERTICAL RETORTS
Isbell Porter Co. 143

PIPE CATALOG, GENERAL
McWane Cast Iron Pipe Co. 483

SMALL PIPE CATALOG
McWane Cast Iron Pipe Co. 484

HANDBOOK OF CAST IRON PIPE (DISTRIBUTED TO GAS OFFICIALS AND ENGINEERS ONLY)
Cast Iron Pipe Research Assn. 178

SAFEGUARDING YOUR PIPE LINE INVESTMENT
Johns Manville

SEMET SOLVAY PIPING AND VALVES
Semet Solvay Engineering Corp. 614

BLOWERS

VICTOR-ACME BLOWERS
Roots-Connersville-Wilbraham 641

CONNERSVILLE CYCLOIDAL PUMPS
The Connersville Blower Co. 333

R-C-W HEAVY DUTY BLOWERS
Roots-Connersville-Wilbraham 634

R-C-W STANDARD DUTY (TYPE SD) BLOWERS
Roots-Connersville-Wilbraham 633

PIPE (Coatings, Couplings, Joints, Welding Equipment)

STEEL PIPE COUPLINGS
S. R. Dresser Mfg. Co. 669

STREET DEPARTMENT SUPPLIES
Safety Gas Main Stopper Co. 670

HIGH TEST WELDING ROD
The Linde Air Products Co. 82

JOINT SEALING COMPOUND
Quigley Company, Inc. 485

LONG PIPE LINES WITH OXWELDED JOINTS
The Linde Air Products Co. 81

OXWELD
The Linde Air Products Co. 671

OXY-ACETYLENE TIPS
The Linde Air Products Co. 672

METERS

APPARATUS BULLETINS
American Meter Co. 673

CAST IRON GAS METERS
Sprague Meter Co. 284

EMCO STANDARD DOMESTIC AND CURB BOX METERS
Pittsburgh Equitable Meter 416

EMCO TIN METER
Pittsburgh Equitable Meter Co. 268

EMCO NO. 5 LARGE CAPACITY PRESSED STEEL GAS METER
Pittsburgh Equitable Meter Co. 269

EMCO DEMAND METER
Pittsburgh Equitable Meter Co. 266

EMCO LARGE CAPACITY POSITIVE GAS METERS
Pittsburgh Equitable Meter Co. 674

MONEL WET TYPE METERS
Superior Meter Co. 223

(Continued on page 78)

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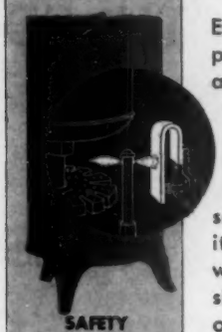

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TRADE CATALOGS

(Continued from page 76)

INSTRUCTIONS FOR CONNERSVILLE TANDEM METERS
The Connersville Blower Co. 337

INSTRUCTION FOR THE INSTALLATION AND OPERATION OF CONNERSVILLE ROTARY DISPLACEMENT METERS
The Connersville Blower Co. 341

INSTRUCTIONS FOR THE MAXIMUM DEMAND RECORDER
The Connersville Blower Co. 336

INSTRUCTIONS FOR THE USE OF THE P. V. T. T. RECORDING GAUGE
The Connersville Blower Co. 342

IRONCLAD CAST IRON DRY GAS METER
Pittsburgh Equitable Meter Co. 264

DREADNAUGHT TYPE METERS
Sprague Meter Co. 227

GAS METERS AND APPARATUS
Lambert Meter Co., Inc. 173
American Meter Co. 338
Superior Meter Co. 527

INSTRUCTIONS FOR THE PROVING AND TESTING OF METERS
American Meter Co. 120
Superior Meter Co. 528

LINDERMAN LARGE VOLUME GAS METERS
American Meter Co. 339

METER CATALOGS
American Meter Co. 121

METERS AND DIAPHRAGMS
Superior Meter Co. 224

"METRIC" FLOW METERS
American Meter Co. 343

RECORDING DEMAND FLOWMETER
Lambert Meter Co. 675

DEMAND GAS METERS
Bulletin 13—Sprague Meter Co. 305

"WESTCOTT" ORIFICE METERS
American Meter Co. 344

SPRAGUE LINE OF LOW PRESSURE REGULATORS
Sprague Meter Co. 488

RECHROME AND OILED METER LEATHERS
Besse Osborne & Odell 570

MISCELLANEOUS

CLEVELAND TRENCHES
Cleveland Trencher Co. 417

ADJUSTABLE CYLINDER METER HANGERS
Mueller Co. 489

CLEANING COMPOUND ANNITE
Quigley Co., Inc. 490

BITUMEN HEATERS
Mohawk Asphalt Heater Co. 571

LEAD AND COMPOUND MELTING FURNACES
Mohawk Asphalt Heater Co. 572

PIPE DIPPING TROUGHS
Mohawk Asphalt Heater Co. 573

OIL BURNING TORCHES
Mohawk Asphalt Heater Co. 574

COMBINATION TOOL ASPHALT & SURFACE HEATERS
Mohawk Asphalt Heater Co. 575

KROMEPATCH IS USED IN ALL INDUSTRIES
E. J. Lavino & Co. 615

MOHAWK HIGH-SPEED TRADER TOOL CHART
Mohawk Asphalt Heater Co. 576

MOHAWK HI-SPEED UTILITY TRAILERS 2 AND 4 WHEEL
Mohawk Asphalt Heater Co. 577

CORK DIPPING PANS
Mohawk Asphalt Heater Co. 578

STREET DEPARTMENT SUPPLIES
Safety Gas Main Stopper Co. 616

GOODMAN CYLINDRICAL STOPPERS
Safety Gas Main Stopper Co. 617

GOODMAN GAS MAIN STOPPERS
Safety Gas Main Stopper Co. 618

GAS MAIN BAGS
Safety Gas Main Stopper Co. 619

SAFETY SERVICE PLUGS
Safety Gas Main Stopper Co. 620

PIPE CLEANING BRUSHES
Safety Gas Main Stopper Co. 620

GARDNER-GOODMAN STOPPER
Safety Gas Main Stopper Co. 621

GAS APPLIANCES

INDUSTRIAL EQUIPMENT

AIR HEATER BULLETIN
Surface Combustion Co. 505

RIVET HEATERS
Surface Combustion Co. 506

POTATO CHIP FURNACES
Surface Combustion Co. 507

AUTOMATIC BOILER FEED SYSTEMS
P. M. Lattner Mfg. Co. 287

FURNACES, TORCHES, BURNERS FOR HEATING SOLDERING, METAL-MELTING, HEAT TREATING
Johnson Gas Appliance Co. 526

GAS FIRED HIGH PRESSURE BOILERS
P. M. Lattner Mfg. Co. 286

HIGH EFFICIENCY FLUELESS INDUSTRIAL GAS BOILERS
P. M. Lattner Mfg. Co. 704

PROFITABLE BAKING
Bruce McDonald Co. 39

THE RED DEVIL OVEN
Bruce McDonald Co. 38

LINOTYPE TEMPERATURE CONTROL
Robertshaw Thermostat Co. 418
The Partlow Corpn. 637

LAVA FOR MECHANICAL AND ELECTRICAL PURPOSES
American Lava Corpn. 487

MANTLE RECUPERATORS
Surface Combustion Co. 515

NEW PROCESS OF NITRIDING
Surface Combustion Co. 508

MONOTYPE TEMPERATURE CONTROL
Robertshaw Thermostat Co. 419
The Partlow Corpn. 638

UNIVERSAL CONTACTORS FOR INDICATING TEMPERATURE
The Partlow Corpn. 636

METAL MELTING POT TEMPERATURE CONTROLLER
Robertshaw Thermostat Co. 420
The Partlow Corpn. 639

MOTION IN BAKING
Bruce McDonald Co. 501

JOHNSON DIRECT JET FURNACES AND APPLIANCES
Johnson Gas Appliance Co. 554

THERMOSTATIC HEAT CONTROL FOR COFFEE URNS AND STEAM TABLES
Johnson Gas Appliance Co. 530

JOHNSON INDUSTRIAL GAS APPLIANCES
Johnson Gas Appliance Co. 531

SAFETY GAS VALVES FOR INDUSTRIAL FURNACES, OVENS AND POTS
The Partlow Corpn. 640

AUTOMATIC GAS BURNING EQUIPMENT
The Partlow Corpn. 650

TEMPERATURE CONTROLS
The Partlow Corpn. 651

HOUSE HEATING

ARCHITECT'S CATALOG
American Gas Products Corpn. 246

AUTOMATIC UNIFORM HEAT
Roberts-Gordon Appliances Corpn. 551

BOILER TRADE CATALOG
American Gas Products Corpn. 245

BOILER CONSUMER CATALOG
American Gas Products Corp. 244

CONVERSION BURNERS FOR ALL FURNACES AND BOILERS
Barber Gas Burner Co. 469

FOR SECTIONAL BOILERS
Roberts-Gordon Appliances Corp.

(Continued on page 80)

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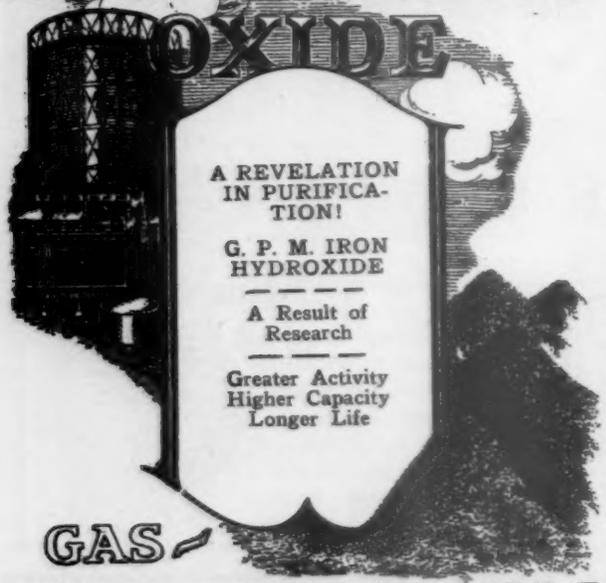

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TRADE CATALOGS

(Continued from page 78)

HOMESTEAD FIRES
The Homestead Heater Co. 19

HOUSE HEATING DATA BOOK
Roberts-Gordon Appliance Corp. 340

HOUSE HEATING CATALOG
Surface Combustion Co. 509

IDEAL GAS BOILER HANDBOOK
American Gas Products Corpn. 243

NEW JOHNSON CONVERSION BURNER
Johnson Gas Appliance Co. 532

SALES ALBUM
Barber Gas Burner Co. 467

SALES LITERATURE
Barber Gas Burner Co. 468

HOUSE HEATING FURNACES
Geo. D. Roper Corpn. 491

TRANSFORM BY GAS
The Barber Gas Burner Co. 606

SELL HEALTH AND COMFORT IN THE HOME
Roberts Gordon Appliance Co. 676

SELLING THE HOME HEATING MARKET
Robert Gordon, Appliance Co. 607

LET STAT-AMATIC REGULATE YOUR GAS FURNACE
Stat-amatic Instrument & Appliance Co. 622

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Stat-amatic Instrument & Appliance Co. 623

THE DUAL THERMOSTAT
Stat-amatic Instrument & Appliance Co. 624

STAT-AMATIC MOTORIZED VALVES
Stat-amatic Instrument & Appliance Co. 625

RANGES

THE CAREFREE HOSTESS
American Stove Co. 252

SUNDAY DINNER
American Stove Co. 251

THE SECRET OF HAPPY HOMES
American Stove Co. 250

GAS RANGES
American Stove Co. 253

ADVERTISING MANUAL
George D. Roper Co. 48

MERCHANDISING GAS APPLIANCES TO THE HOUSEWIFE
Geo. D. Roper Corpn. 49

RANGE CATALOG
Geo. D. Roper Corpn. 51

RANGE CATALOG
New Process Stove Co. 260

RANGE CATALOG
Dangler Stove Co. 261

RANGE CATALOG—ORIOLE GAS RANGES
Standard Gas Equipment Corpn. 346
Standard Gas Equipment Corpn. 347

RANGE CATALOG—ACORN GAS RANGES
Standard Gas Equipment Corpn. 348

RANGE CATALOG—VULCAN HEAVY DUTY COOKING EQUIPMENT
Standard Gas Equipment Corpn. 349

ROPER GAS RANGES—APPLIANCES
Geo. D. Roper Corpn. 288

SALESMAN'S MANUAL
Geo. D. Roper Corpn. 50

RANGE CATALOG—SMOOTH TOP GAS RANGES

SNAP ACTION THERMOSTAT FOR STORAGE WATER HEATERS & HOUSE-HEATING EQUIPMENT
Robertshaw Thermostat Co. 400

THROTTLING TYPE WATER HEATER THERMOSTAT
Robertshaw Thermostat Co. 401

THERMOSTAT BULLETINS
Robertshaw Thermostat Co. 492

THERMOSTAT FOR SPACE HEATERS, GARAGE HEATERS, ETC.
Robertshaw Thermostat Co. 402

UNIT- OR GAS-FIRED HEATER
American Gas Products Corpn. 459

A. G. P. GAS-FIRED STEAM RADIATORS, UNVENTED AND VENTED
American Gas Products Corpn. 460

VULCAN GAS APPLIANCES
Standard Gas Equipment Corpn. 350

PILOTS & CONTROL

"PATROL" PILOT AND TEMPERATURE CONTROL
The Patrol Valve Co. 608

THERMOLATOR OVEN HEAT CONTROL
Milwaukee Gas Specialty Company 630

REFRIGERATION

APARTMENT HOUSE BOOK
Electrolux Refrigerator Sales, Inc. 493

ARCHITECTS MANUAL
Electrolux Refrigerator Sales, Inc. 494

GENERAL CONSUMER BOOKLET
Electrolux Refrigerator Sales, Inc. 495

SECRET OF SILENCE IN REFRIGERATION
Electrolux Refrigerator Sales, Inc. 301

WATER HEATING

THE UTILITY CONSTANT HOT WATER
Welsbach Co. 72

KOMPAK BOOK
Kompak Co. 263

WARM FRIENDS (RADIANT GAS HEATERS)
Welsbach Co. 71

PAINT

QUIGLEY TRIPLE-A PROTECTIVE COATINGS
Quigley Company 345

PROTECT AND DECORATE
Quigley Furnace Specialties Co. 407

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Alpha Lux Co., Inc. 81
Ambassador Hotel 77
American Cast Iron Pipe Co. .....Fourth Cover
American Meter Company 4
American Stove Company 11
Andale Co. 80

Bartlett Hayward Co. 22
Besse, Osborn & Odell 65
Boone County Coal Corp. .....Front Cover
Byllesby Engineering & Management Corp. 76

Cast Iron Pipe Research Ass'n. 8
Chace Valve Co., W. M. 78
Chaplin-Fulton Mfg. Co. 72
Cleveland Trencher Co., The 79
Connelly Iron Sponge & Governor Co. 79
Connersville Blower Co. 15
Cruse-Kemper Co. 9

Dresser, S. R., Mfg. Co. 21

Electrolux Refrigerator Sales, Inc. 6-7

Faraday Refrigerator Corp. 12-13

Gas Machinery Co. 79
Gas Purifying Materials Co. 80
General Gas Light Co. 73
Groble Gas Regulator Co. 77

Homestead Heater Co. 79

Improvement Equipment-Russell Engr. Co. 17
International-Stacey Corp 15
Isbell Porter Co. 79

Johnson Gas Appliance Co. 75

Kompak Company 2

Lambert Meter Co. 74
Lattner Mfg. Co., P. M. 76
Linde Air Products Co. 16
Littleford Bros. 71

McClintic-Marshall Co. 78
Mohawk Asphalt Heater Co. 79

National Tube Company 19

Philgas Company 18
Pittsburgh Equitable Meter Co. 83
Precision Thermometer & Instrument Co. .. 75

Reynolds Gas Regulator Co. 20
Roberts Gordon Appliance Corp. 77
Robertshaw Thermostat Co. 69
Roots Co., P. H. & F. M. 15

Safety Gas Main Stopper Co. 79
Semet-Solvay Engineering Co. 5
Sprague Meter Co. 67
Stacey Bros. Gas Construction Co. 15
Stacey Manufacturing Co., The 15
Stat-Amatic Instrument & Appliance Corp. 74
Superior Meter Co. 71
Surface Combustion Corporation 14

Unger, John S. 81
Union Carbide & Carbon Corp. 16
United Engineers & Constructors, Inc. 10

Wilbraham-Green Co. 15
Wolverine Tube Co. 79

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III. Comparative Fuel Costs
IV. Capacity of Pipes, Meters and Gas Orifices
V. Appliance Installation
VI. The Gas Range
VII. Gas Range Accessories
VIII. The Gas Water Heater
IX. Water Heater Accessories
X. Gas for Househeating
XI. The Househeating Furnace and Accessories
XII. Calculating Househeating Requirements
XIII. Miscellaneous Househeating Considerations
XIV. Space Heaters
XV. The Health Givers of the Cellar, Incinerator and Laundry Equipment
XVI. Gas Refrigeration
XVII. The Future of Gas Utilization

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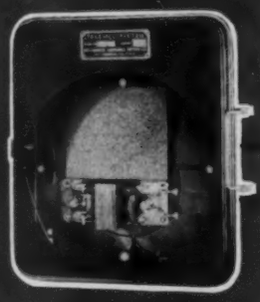
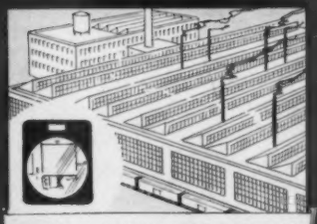
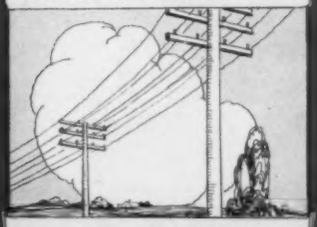
The TELEMCO SYSTEM



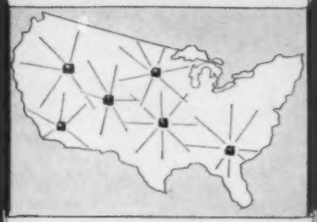
PROVIDES



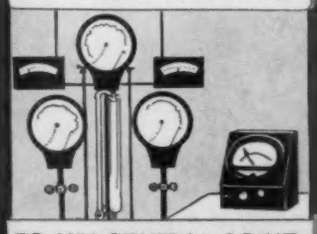
FROM ANY LOCATION



BY LEASED TELEPHONE LINE



OVER LONG DISTANCE



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